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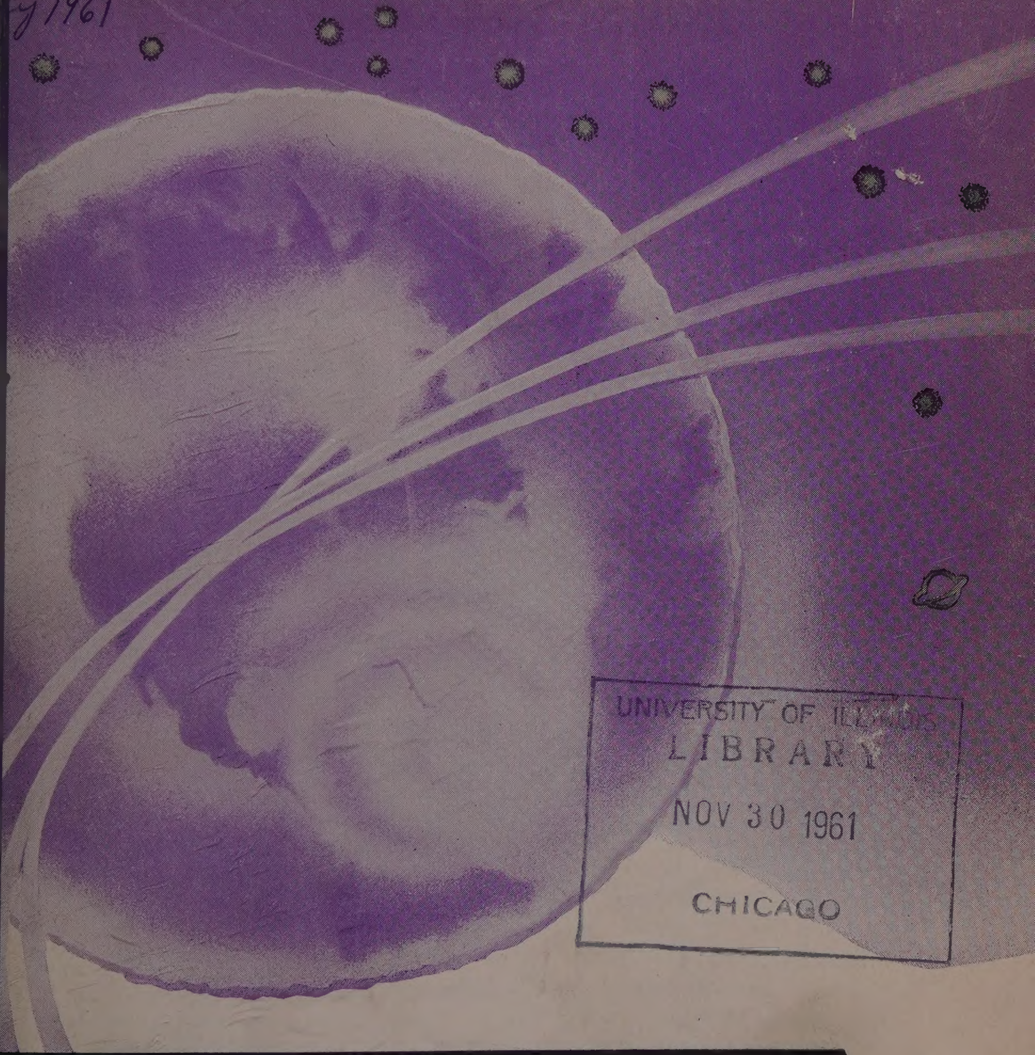

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MALCOLM RIGBY, Editor

Vol. 12 July 1961 No. 7

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Annotated Bibliography on Precipitation Chemistry

By

Malcolm Rigby and Evelyn Z. Sinha

(For complete table of contents see back cover)

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FOREWORD

Meteorological and Geoastrophysical Abstracts is a monthly publication devoted to current literature in meteorology, geophysics and astrophysics.

Part I contains abstracts of current literature in the fields of meteorology, etc.

Part II of each issue comprises an annotated bibliography of important references on a special subject. Bibliographies published in the successive issues were:

Vol. I, 1950

1. Atmos. Pollution
2. Aerobiology
3. Cloud Physics
4. Hail
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4. Constants, etc.
5. Clim. of Near East
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2. Texts & Monogr. Bibliogs.
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8. Snow Micromet. (Suppl.)
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4. Waves and Currents
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8. Evaporation Measurement
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Vol. XI, 1960

1. Outstanding Reference Works
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3. Numerical Forecast. (Suppl.)
4. Ionospheric Physics
5. Ionospheric Propagation
6. Ionosphere
7. Forecast Verification
8. Radar Meteorology
9. Rocket Meteorology
10. Satellite Meteorology
11. Airglow

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1. *Aurora*
2. *Auroral Physics*
3. *Limnology*
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7. *Precipitation Chemistry*
8. *Upper Atmos. Humidity*
9. *Planetary Atmospheres: General*
10. *Planet. Atmos.: Mars, Venus & Saturn*
11. *Jovian Planets and Moon*

Part III contains a listing of reviews, translations, reprints, and the contents of important publications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DNLM:	U. S. National Library of Medicine, Washington, D. C.
DSI:	Smithsonian Institution, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts.

Geographic locations are in the English form rather than the form used locally, for example, Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet using a modification of the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau, Jahrgang* 2 (Vol. 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL AND GEOASTROPHYSICAL MATERIAL

A. GENERAL

A1. COLLECTED WORKS

See also: **Ninth Report of Comm. for the Study of Solar and Terrestrial Relationships,** 12.7–130.

12.7–1 551.510.42(08)

*†Conference on Aerodynamic Capture of Particles, Leatherhead, Surrey, Jan. 13–14, 1960. **Proceedings,** ed. by E. G. Richardson, Pub. in *International Journal of Air Pollution*, Oxford, (1/3):3–200, Oct. **1960.** figs., tables, bibliogs., eqs. (For listing of contents, *see* 12(2):393, eb. 1961, *Met. Abs.* All articles abstracted separately.) **DWB, DLC**—The papers collected n this issue were presented at a symposium on aerodynamic capture of particles, held between an. 13–14, 1960, in the lecture room of the British Coal Utilization Research Association, eatherhead. The proceedings of the Symposium were held in three sessions: the first session iscussed the theoretical and fundamental aspects of the problem, the second session dealt ith the experimental application of capture techniques and the third session considered the apture of particles by raindrops. *Subject Headings:* **1. Aerodynamic capture of particles . Aerodynamic particle capture symposia. I. Richardson, E. G.** (*ed.*).—*I.S.*

12.7–2 551.585.9(213)

*†United Nations Educational, Scientific and Cultural Organization, **Problems of humid ropical regions.** Its *Humid Tropics Research* [unnumbered report], pub. Paris, UNESCO; ondon, H. M. Stationery Office, **1958.** 102 p. figs., tables, bibliogs. Chart (fold. in back over). English and/or French summary at end of each article. Contents (all articles bstracted separately): Camargo, Felisberto C., **Report on the Amazon region,** p. 11–24. eltran, Enrique, **Report on the Caribbean region,** p. 25–42. Janaki Ammal, E. K., **Report n the humid regions of South America,** p. 43–53. Marlier, G., **Rapport sur les problèmes iologiques de l'Afrique tropicale humide** [Report on biological problems in the humid tropical ne of Africa], p. 57–62. Kapur, A. P., **A report reviewing entomological problems in the umid tropical regions of South Asia,** p. 63–85. Rodriguez, Filemon G., **Problems of the umid tropical Philippines with special reference to water resources development,** p. 86–99. **LC** (SB111.U56). Review by L. Dudley Stamp in *Nature*, London, 181(4620):1380, May 17, **958.** Review by John P. Tully in *Science*, 133(3467):1818–1819, June 9, **1961.**—This report nsists of two parts. The first contains general reports which review some of the problems the Amazon, the Caribbean, and the South America regions. The geography of each area outlined with some emphasis on the climatic factor. The specific geographic problems of ch area are indicated. The second part contains special reports which illustrate specific pects of some of the problems in Africa, South Asia and the Philippines. The reports are sed on available literature and are intended to draw attention to those principles and methods nerging from the work done in these regions which might be of interest in other humid gions. Useful bibliographies are included. *Subject Heading:* **1. Humid tropics research.** -*E.Z.S.*

12.7–3 551.579.4(540)(08)

*†Symposium on Meteorological and Hydrological Aspects of Floods in India, New Delhi, pril, 1958. **Proceedings of the Symposium.** Delhi, Indian Meteorological Dept., **1959.**

205 p. figs., tables, refs., eqs. Contents (all articles abstracted separately): Basu, S., **Hydrometeorological studies in India: a general view,** p. ix–xi. Ahuja, P. R. and Rao, P. S., **Hydrological aspects of floods,** p. 3–10. Rao, K. N., **Heavy rainfall in India,** p. 11–14. Parthasarathy, K., **Comparison of the depth-area-duration values of the biggest recorded storms in different parts of India,** p. 15–20. Raman, P. K. and Krishnan, A., **Intensity, duration and frequency relation of rainfall at selected stations in India,** p. 21–30. Parthasarathy, K., **Maximum point rainfall and frequency of rainfall of ten inches and over in twenty-four hours over India,** p. 31–36. Sreenivasaiah, B. N. and Yegnanarayanan, S., **Reliability of rainfall during the monsoons in India and a study of the rainfall excesses and deficiencies,** p. 39–48. Sinha, K. L., **Some meteorological aspects of floods in India,** p. 49–51. Koteswaram, P., **Some aspects of the aerology of floods and droughts in India during the southwest monsoon season,** p. 52. summary. Ramaswamy, C., **On jet stream waves and their role in the development of floods in Assam during the premonsoon period,** p. 52. summary. Lal, S. S., **Rainfall around slow moving monsoon depressions over India,** p. 53–56. Dhar, O. N., **Meteorological situations associated with actual major floods in different parts of India,** p. 57–62. Mallik, A. K., **Is the incidence of drought increasing in Bihar and eastern districts of Uttar Pradesh?,** p. 65–70. Rao, K. N., **Some remarks on droughts in Madras State,** p. 71–76. George, C. A., **Synoptic study of the West Bengal floods in September 1956,** p. 77–82. Ramamurthi, K. M., **A study of the distribution of heavy rainfall which caused serious floods in West Uttar Pradesh in September, 1924,** p. 83–88. Kumra, P. N., **Place of flood forecasting in reducing damage by floods,** p. 91–92. Parthasarathy, K., **Flood forecasting and flood warning in India: a general review of the problem,** p. 93–98. Mulay, N. L., **Comparative analysis of the daily weather forecasts with actuals for the Damodar basin,** p. 99–100. Roy, A. K., **Possibilities of control of drought and floods by present known techniques of cloud modification,** p. 103–108. Savur, S. R., **New method for artificial stimulation of clouds,** p. 109–112. Ramana Murthy, Bh. V., **Artificial inducement of rain by electrostatic stimulation of clouds,** p. 113–114. Srivastava, R. C., **On the methods of evaluation of artificial rain making experiments,** p. 115–122. Uppal, H. L. and Sehgal, S. R., **Examination of the peak discharge data of the Punjab Rivers,** p. 125–130. Panchang, G. M.; Rangarajan, R. and Narayanan, R., **Estimation of peak floods of long term return periods,** p. 131–142. Rao, K. N. and Krishnan, A., **Application of Gumbel's method for determination of maximum probable rain storms,** p. 143–146. Mazumdar, K. C., **Statistical study of a succession of droughts and floods,** p. 147–153. Williams, S. D., **Frequency of floods and droughts in South India,** p. 154–156. Srinivasan, T. R. and Venkataraman, R., **Frequency of spells of 'abnormal' and 'subnormal' rains in Bihar,** p. 157–159. Prakash, Ved, **Dry days in North Bihar during June to September,** p. 160–163. Ramakrishnan, K. P. and Krishnan, A., **Spells of (1) heavy rain and (2) rainless days at selected stations in India,** p. 164–167. Subrahmanyam, V. P., **Droughts and aridity in India; a climatic study,** p. 171–177. Chelam, E. V., **Vertical velocity and rainfall computations,** p. 178–179. Pant, P. S., **Trends in the annual rainfall of three east coast stations,** p. 180–185. Rao, K. N. and Raman, P. K., **Diurnal variation of rainfall in India,** p. 186–191. Rao, K. N., **An approach to the problem of determination of probable maximum hourly rainfall from daily rainfall,** p. 192–195. Krishnan, A.; Raman, P. K. and Vernekar, A. D., **Probable maximum twenty-four hour rainfall over India,** p. 196–202. Krishna Rao, P. R., **Method of summarising and presenting rainfall data for the study of floods and droughts,** p. 203–205. **DWB** (M79.4 S989pr)—The symposium sponsored by the India Meteorological Department, was held in New Delhi, April 18–20, 1958. Thirty-seven papers were presented in addition to the inaugural address of A. N. KHOSLA, and the introductory review on hydrometeorological studies given by S. BASU. The content of the papers represent various long-term country-wide studies. Rainfall, storm, flood and drought data for varying periods of time are tabulated and discussed. Monsoon characteristics are described, rainfall reliability and probability maps of India are included. Flood and drought history, and forecasting and also a climatic study of India are the subjects of other papers. A synoptic study of floods in West Bengal is given with considerable detail. Weather modification, cloud stimulation and modification are treated by several authors. The papers contain informative abstracts. *Subject Headings:* **1. Flood symposia 2. Floods 3. India. I. India. Meteorological Dept. II. Indian Meteorological Society.**—*E.Z.S.*

12.7–4 551.513.1:551.511

*†Johns Hopkins Univ. Dept. of Civil Engineering, **Research on large scale atmospheric circulations.** George S. Benton, Project director. Contract AF 19(604)-916, Final Report, **Oct. 1957.** 332 p. figs., tables, refs., eqs. Contents: Benton, George S.: **The energy balance of North America,** p. 9–88. Kahn, Arthur B.: **A generalization of average-correlation methods of spectrum analysis,** p. 89–99. Ogura, Y.: **Spectrum modification due to the use of finite differences,** p. 101–106. Benton, George S. and Kahn, Arthur B.: **Spectra of large scale atmospheric flow at 300 Mb,** p. 107–128. Benton, George S. and Kahn, Arthur B.: **A complete tabulation of atmospheric spectra at 300 Mb,** p. 129–165. Ogura, Y.: **On the isotropy of large scale disturbances,** p. 167–203. Ogura, Y.: **Temperature fluctuations in an isotropic turbulent flow,** p. 205–231. Ogura, Y.: **Note on the energy transfer in Burgers' model of turbulence,** p. 233–241. Kao, Shih-Kung: **The quasi-Lagrangian system of hydrodynamic equations with potential temperature as an independent variable,** p. 243–274. Kao, Shih-Kung: **Wave motion in a rotating couette flow of a viscous fluid,** p. 275–285. Ogura, Y.: **Wave solutions of the vorticity equation for the 2 1/2 dimensional model,** p. 287–293. Benton, George S.,: **Some comments on the numerical integrations of the vorticity equation and related equations,** p. 295–332.—This volume contains a list of materials on data processing, techniques for evaluating the divergence and convergence of enthalpy in the lower and higher latitudes. The atent heat in the atmosphere over the North American continent is discussed in three parts with tables and charts that illustrate the diurnal, monthly and annual distributions of such heat over the 35°N to 65°N long. and 65°W to 145°W regions. A preliminary research on the latent heat circulation in the atmosphere spells out the need for a more conventional approach to the generalization of average correlation methods in analyzing the spectra. The study shows the dependence of the magnitude of vorticity spectrum. Other subjects discussed separately and abstracted individually are: the spectra of large scale atmospheric flow at 300 mb and large scale atmospheric turbulence. Complete spectra tables as well as the isotropy of arge scale disturbances in the upper troposphere are discussed. The fifth and sixth parts of the report analyze the quasi-Lagrangian system of hydrodynamic equations. *Subject Headings:* **1. Large scale circulation 2. Latent heat circulation.**—*N.N.*

12.7–5 551.510.53:533.6(08)

Symposium on Aerodynamics of the Upper Atmosphere, Santa Monica, Calif., June 8–10, **1959, Aerodynamics of the upper atmosphere.** [Papers] comp. by David J. Masson. Santa Monica, Calif., Rand Corp., **1959.** 21 papers, each repaged. figs., diagrs. (*Rand Corporaion, Santa Monica,* [*Publication*], R-339). Contents: Schaaf, S. A., **Aerodynamics of satelites,** (Paper No. 1). Whitney, C. A., **Orbital dynamics and the interpretation of orbital data,** (Paper No. 2). Kallmann, H. K., **Preliminary model atmosphere based on rocket and satellite data,** (Paper No. 3). Schilling, G. F., **Satellite research: Results and plans,** (Paper No. 4). Kerfott, H. Potter, **Influence of aerodynamic drag on satellite orbits,** (Paper No. 5). Gazley, Carl, Jr., **Meteoric interaction with the atmosphere; theory of drag and heating and comparison with observations,** (Paper No. 6). Liu, V. C., **Rarefied-gas dynamical considerations in the ocket-sounding measurements,** (Paper No. 7). Hurlbut, F. C., **Progress in studies of sputterng by beam techniques,** (Paper No. 8). Wehner, Gottfried, **Studies of the interaction of high elocity atmos with solid surfaces by means of gas discharge devices,** (Paper No. 9). Liepmann, H. W. and Cole, J. D., **Problems in gaseous effusion,** (Paper No. 10). Grad, Harold, **Equations of flow in a rarefied atmosphere,** (Paper No. 11). Schamberg, R., **Analytic repreentation of surface interaction for free molecule flow with application to drag of various bodies,** (Paper No. 12). Willis, D. Roger, **Study of near free molecule flow,** (Paper No. 13). Bauer, C.; Wolf, E. S. and Zlotnick, M., **Time-history dependent transport coefficients and shocktructure calculations in transitional,** (Paper No. 14). Charwat, A. F., **Lift and pitching moment in near-free-molecule flow,** (Paper No. 15). Kraus, L., **Electro-hydrodynamic drag f satellites,** (Paper No. 16.). Beard, David B., **Induction drag on satellites,** (Paper No. 17). Burns, G. A.; Linder, W. J.; Schorsch, J. F.; Steele, H. L. and Schulte, H. F., **Formation of a adio frequency plasma at an antenna during falling sphere measurements,** (Paper No. 18). Greifinger, P. S., **Induced oscillations in a rarefied plasma in a magnetic field,** (Paper No. 19). Bader, Michel, **On the problem of obtaining thermal proton background and solar wind measurements in space,** (Paper No. 20). Hurlbut, F. C., **Notes on surface interaction and**

satellite drag, (Paper No. 21). These papers abstracted separately. **DWB** (M10.5 R186ae)—The papers listed in the "Contents" represent the material discussed at the Symposium of Aerodynamics of the upper atmosphere at the Rand Corporation, June 8–10, 1959. They cover a variety of aspects of rarefied gas dynamics, especially the interaction of a high-velocity body with the upper atmosphere. They are aimed to promote knowledge about the characteristics of the upper atmosphere and the earth as well as about the gas-dynamic characteristics of flight in the upper atmosphere involved in the recovery of a manned vehicle from space. An informal study group, meeting at Rand during the first two weeks of Sept. 1958, discussed the areas of greatest uncertainty in relation to the interaction between impinging atmospheric particles and the body surface; the electric charge drag and atmospheric characteristics. *Subject Headings:* **1. Upper atmosphere 2. Aerodynamics of upper atmosphere 3. Satellite drag.**—*O.T.* Ⓢ

A2. MONOGRAPHS AND BOOKS

See also: **Phenology of Austria since 1826** (Reiss), 12.7–259; **Statistical study of turbulence** (Frenkeil), 12.7–379.

12.7–6 551.510.53:551.557(73)

*Belmont, Arthur D., **Reversal of stratospheric winds over North America.** General Mills, Inc., Minneapolis, Mechanical Div., Contract AF 19(604)-6618, Scientific Report, No. 1, June 22, 1960. 24 p. 50 figs., tables, 18 refs. **DWB**—The prevailing monthly frequency and mean zonal component of easterly and westerly winds from 15 to 30 km are presented in the form of 48 vertical cross sections along the west and east coasts of North America for about five years of record. The tropical easterlies move northward in April and the polar easterlies (existent to some extent all winter) are first prevalent in March. Mid-latitude westerlies separate the two easterly belts in March and April, but in May there is easterly flow at most latitudes above 23 km except near the pole. By July easterlies prevail down to at least 15 km in low latitudes, to 20 km in mid-latitudes, and to 15–17 km at polar latitudes. In August the polar and tropical easterlies are separated and by September the tropical easterlies start retreating to their minimum in December, and the polar easterlies to their minimum frequency which is reached apparently in November. *Subject Headings:* **1. Stratospheric wind data 2. Reversal of stratospheric winds 3. North America.**—*Author's abstract.*

12.7–7 551.582.2:551.524.36:551.553.6(4,5)

*Rayner, J. N. (*ed.*), **Temperature and wind frequency tables for Eurasia, Vol. 2, April–June.** McGill Univ. Arctic Meteorology Research Group, Contract DA 19–129-QM-1447, [Unnumbered Report]; Publication in Meteorology, No. 20, June 1960. 206 p. Entirely tables (2 p. text). Also **Vol. 3, July–Sept.** Ibid., No. 21, June 1960. 206 p. And **Vol. 4, Oct.–Dec.** Ibid., No. 23, July 1960. 205 p.—The frequency tables present slightly modified versions of those supplied to the Arctic Meteorology Research Group by Headquarters Quartermaster Research and Engineering Command, U. S. Army with data originally compiled and tabulated by the Directorate of Climatology, U. S. A. F. The tables are arranged alphabetically by country and then by station. They present temperature and wind speed frequencies. Small errors in some figures result from making no corrections after omitting temperature classes for outside the present range. *Subject Headings:* **1. Climatic data 2. Temperature frequencies 3. Wind frequency data 4. Europe 5. Asia.**—*From the Introduction* (*O.T.*)

12.7–8 551.510.62:551.510.52:621.396

U. S. National Bureau of Standards, **Fourth summary report of Boulder Laboratories for year ending June 30, 1958.** 239 p. (*NBS Report* 6013) Appendix: **List of publications and reports from Director's office and the Laboratories, 1946–1958.** (For abstract on 3d report, *see* 8J–171, Oct. 1957, *Met. Abs.*) **DWB** (621.384 U583a). Also: **Fifth summary report of Boulder Laboratories for year ending June 30, 1959.** 325 p. (*NBS Report* 6076.) Also: **Research highlights of the . . . Bureau, 1959.** Its *Miscellaneous Publication* 229, Dec. 1959. 169 p. figs., photos. Publications in the Bureau's series, and in outside journals, p. 148–169. **DWB** (505 U585res). Also: **Sixth summary report of Boulder Laboratories for year ending June 30, 1960.** 392 p. (*NBS Report* 6717.) Appendix: **List of publications and reports,**

July 1954–June 1960.—Projects reported in the fourth summary of work of the Boulder Laboratories (or contracts supervised by them) include: Upper atmospheric research (T. N. Gautier); prediction of propagation at VLF, in Arctic; at vertical incidence, oblique incidence, dynamo-theory, sferics, whistlers, sporadic E, airglow and auroras, atmospheric physics, radio radiation from planets; Ionospheric research (E. K. Smith); Solar-terrestrial relationships (A. H. Shapley); Radio forecasts, solar influences, IGY data, ionospheric and meteor relationships, radio propagation in troposphere (C. F. Peterson and R. S. Kirby); Radio meteorology (B. R. Bean); Atmospherics (W. G. Crichlow), etc. An extensive bibliography of NBS Reports and papers is appended. In the section on radio propagation of the 1959 issue of **Research Highlights,** the profile tells of accurate measurements of electron densities to 750 km. World maps of the ionosphere have been issued and computers have been used to compile these maps in a manner similar to that used in synoptic meteorology. These methods are to be used in prediction. Worldwide radio refractive index maps have also been prepared and used in statistical prediction of refraction effects. An air-borne refractometer (model 3) was developed for use in tropospheric turbulence and refractive index studies. The fifth summary report (#6076) gives in more detail the projects and results in each of the above fields plus information on upper atmosphere physics research, Es studies, Arctic field analysis, airglow and aurora, IGY data center for airglow and ionosphere, solar influences, meteor burst signals, IGY world warnings, etc. The 1960 volume contains, in addition to detailed reports on the above subject areas, reports on upper atmosphere and space physics (index, C. G. LITTLE, Chief), reports on theoretical astrophysics, on low frequency and very low frequency propagation (A. G. JEAN, Chief), on African ionosphere, etc. *Subject Headings:* **1. Boulder (Colo.) Laboratories reports 2. Tropospheric radio wave propagation research 3. Ionospheric radio wave propagation research.**—*M.R.*

12.7–9 551.5(213) 551.589(265/59)

*†Ramage, C. S. (*ed.*), **Notes on the meteorology of the tropical Pacific and southeast Asia.** Hawaii University. Institute of Geophysics, Contract AF 19(604)-1942, Interim Report, Dec. **1959.** 174 p. numerous figs., tables and refs. Appendices, p. 142–174. Reprints from *Journal of Meteorology* and *American Meteorological Society, Bulletin*, separately abstracted. (For abstracts of these articles, *see* 3.9–191, 4.6–104, 4.8–191, 6F–333, 6.9–161, *Met. Abs.*) **DWB**—This report is designed to supplement other texts on tropical meteorology. It makes use of new observational material and accords the synoptic features of the monsoons more attention than they have received in the past. Hints on analysis, and the uses of auxiliary charts and continuity are followed by a chapter on the physical geography of the Pacific and a gazetteer describing the locations and environments of observing stations. Ch. 3 tabulates monthly mean resultant winds, steadiness and other derived data at standard pressure levels for 34 sounding stations. Ch. 4, which broadly considers the climatology of the region, leads to more detailed discussions of the synoptic climatology of the tropospheric field of motion in the central Pacific (Ch. 5) and of the synoptic climatology of the China Seas and southeast Asia (Ch. 6). Appendices amplify the topics covered in this chapter. The final chapters are devoted to tropical cloud physics, local effects and aerial weather reconnaissance. *Subject Headings:* **1. Tropical meteorology 2. Monsoons 3. Physical geography of Pacific 4. Synoptic climatology in central Pacific 5. Tropical cloud physics 6. Tropical Pacific 7. Southeast Asia.**—*Author's abstract.*

12.7–10 551.582.1(94)

†Australia. Commonwealth Scientific and Industrial Research Organization, **The Australian environment.** Melbourne, University Press, **1960.** 3d ed. rev. 151 p. 32 figs. (including maps, fold.), photos, 14 tables, refs. at end of each ch. Pertinent articles (not abstracted separately): Leeper, G. W., **Climates,** p. 19–28. Taylor, J. K., **Soils,** p. 29–44. Aird, J. A., **Water and irrigation,** p. 57–66. Wood, J. G. and Williams, R. J., **Vegetation: categories of vegetation and their characteristics,** p. 67–84. **DWB** (M86 A938au)—A geography of Australia prepared for the use of delegates to one of a series of British Commonwealth official Scientific Specialists Conferences. It provides an understanding of the history and present stages of development of the plant and animal industries of Australia against the background of their environment. It contains chapters on the physical geography, the soils and

climates of Australia with references for further reading and research. A variety of maps shows mean temperature, mean rainfall and synoptic charts for the seasons and other characteristics of the climate. *Subject Headings:* **1. Geography of Australia 2. Climate of Australia 3. Australia.**—*E.Z.S.*

12.7–11 550.34(47)

†Bessonova, E. N.; Gotsdze, O. D.; Keilis-Borok, V. I. et al., **Investigation of the mechanism of earthquakes.** *Soviet Research in Geophysics* (Issued by American Geophysical Union), Vol. 4, **1960.** 201 p. 78 figs., tables, 110 refs., eqs. **DLC, DWB?** Transl. by Consultants Bureau, N. Y., of original Russian **Issledovanie mekhanizma zemletriasenii,** issued as *Akademiia Nauk SSSR. Geofizicheskiĭ Institut, Trudy,* No. 40(166, i.e. 167), **1957.** "Translation is based on V. I. Keilis-Borok's revision of the text, completed in 1960, and contains added material that was not part of the published Russian text." **DLC**—This book presents the results of work conducted by investigators of the Geophysics Institute of the Academy of Sciences of the U.S.S.R. since 1948 on the investigation of fault plane displacements. A method was developed that makes it possible to determine the mechanical type of fractures at the focus, the dip and strike of the fault plane, and the direction of the displacement and the order of the relative intensity of the first shock. The first part of the book gives the theoretical basis for and a condensed description of the methodology. The problem under investigation relates primarily to the dynamic theory of elasticity which permits, by means of seismic waves, the tie-in between processes at the focus and original data observable on the surface. The second part presents summary data regarding displacements near earthquake centers in the various seismic areas of the U.S.S.R. (the Garm Region, northern Tien Shan, western Turkmeniistan, Kopet-Dag, and the Caucasus) and adjoining regions (Hindu Kush and the Pacific Ocean). Previous work on the subject appears at the beginning of each section. A list of earthquakes processed is included. Seven appendices include details of techniques and calculations. Numerous graphs and maps illustrate the discussions. A general outline map of the region studied is included. The basic construction of the Wulff Grid and meridians and parallels projected on the Wulff Grid are illustrated. Finally, the calculations used in the estimation of the displacement in an earthquake source and source dimensions are given. *Subject Headings:* **1. Earthquake mechanisms 2. Fault plane displacements 3. U.S.S.R. 4. Hindu Kush 5. Pacific Ocean. I. Kirillova, I. V. II. Kogan, S. D. III. Kikhtikova, T. I. IV. Malinovskaia, L. N. V. Pavlova, G. I. VI. Sorskiĭ, A. A.**—*E.Z.S.*

12.7–12 551.586:551.521:581.14

*†Sauberer, Frans and Härtel, Otto, **Pflanze und Strahlung.** [Plants and radiation.] Leipzig, Akademische Verlagsgesellschaft Geest & Portig, **1959.** 268 p. 81 figs., 99 tables, bibliog. p. 241–257. (*Probleme der Bioklimatologie,* Vol. 5) **DWB** (M21.1 s255pf)—The effects of radiation (light rays, ultraviolet, x-ray, Gamma) on plant life are treated in detail with emphasis on the effects of light. The study is an aspect of a larger study begun by RUDDER, RUTTNER and LINKE. Chapter headings are: general comments on electromagnetic and corpuscular radiations, natural ray fields, reaction to warmth, radiation effects on plants, measuring methods, absorption organs of plants, absorbing structures and substances, biological radiation effects and the role of plant pigments, photosynthesis, photosynthesis and substance produced under natural conditions, influence of light on additional reactions of plants. Includes an extensive bibliography, and author and subject indexes. *Subject Headings:* **1. Radiation effects on plants 2. Light effects on plants.**—*E.Z.S.*

A3. TEXTBOOKS

12.7–13 551.1(02)

*†Dapples, Edward C. (*Northwestern Univ.*), **Basic geology for science and engineering.** N. Y., John Wiley, **1959.** 609 p. 234 figs., 58 tables, 14 photos., 154 refs., 69 eqs. Price: $9.50. **DLC** (QE26.D22). Review in *Science Progress,* London, 48(189):160, Jan. **1960.**—A textbook of basic geology intended for the professional student in science and engineering who has some preparation in chemistry, physics and mathematics. The pattern of presentation is organized around empirical relationships; graphs and tables are used extensively. The texk

consists of chapters dealing with soil materials, physical and chemical properties of roct materials, rock-forming minerals, igneous rocks, soil-forming processes, streams, shoreline processes, ground water, wind deposits, processes associated with glaciation, sedimentary rocks, crustal deformation and metamorphism. Selected supplementary reading references are included at the end of each chapter. Tables for the determination of common minerals are included. *Subject Heading:* **1. Geology textbooks.**—*E.Z.S.*

12.7–14 551.1(02)

†Emmons, William H. (*Univ. of Minn.*); Allison, Ira S. (*Oregon St. College*); Stauffer, Clinton R. (*Calif. Inst. of Tech.*) et al., **Geology: principles and processes.** 5th ed. N. Y., McGraw-Hill, **1960.** 491 p. Numerous figs. (incl. photos.), tables, bibliog. at end of each ch., glossary p. 445–472. **DWB** (550 E54ge), **DLC**—This edition of **Geology: Principles and Processes** provides, as did the previous editions, a basic introduction to physical geology for the student planning to major in earth sciences. It includes short treatments of fringe topics in meteorology, climatology, soils, oceanography, and seismology. The text is organized to make possible any sequence of chapter assignments preferred by the instructor or student. One significant difference from previous editions is the treatment of the economic aspects of geology at appropriate places within the text instead of in a separate chapter. The order of presentation differs from that of the previous editions in other ways. Minerals, vulcanism, igneous rocks and sedimentary rocks are treated early to prepare students for concurrent laboratory work on earth materials. Discussion of wind and ground water follows, rather than precedes, the more important topics of stream erosion, glaciation and shore processes. The section on the effect of geologic structures upon stream erosion has been placed in the chapter on stream work. Special attention is given to rainwash, streams, and wind in dry-land areas. *Subject Heading:* **1. Geology textbooks. I. Thiel, George A.** (*Univ. of Minn.*).—*E.Z.S.*

12.7–15 551.5(02)

†Uhlíř, Pavel, **Meteorologie, I.díl.** [Meteorology, Vol. 1] Prague, **1958.** 316 p. 75 figs., tables, 50 refs. At head of t-p.: Vysoká škola zěmědelská v Praze. Fakulta Agronomická. (*Učební Texty Vysokých Škol*). **DLC** (QC861.U35)—This textbook for students of agriculture covers basic knowledge on general meteorology, climatology, phenology, and weather effects on farm crops and livestock. It is written in a clear, concise and not excessively technical manner. Perhaps its most particular merit is the large number of explanatory diagrams on various atmospheric phenomena, on every few pages of the book. Several chapters contain information on conditions in Czechoslovakia, e.g., on the meteorological service, research activities, education, thunderstorms and lightning protection regulations, climate, etc. In the section on microclimatology and bioclimatology, the microclimate of various locations including enclosed spaces and biological effects of every meteorological element are discussed and sample data, mostly taken from foreign literature, are presented. The second part of the two-volume text (not seen) contains a description of instruments and methods of measurement, as well as exercises for classroom and field study. *Subject Heading:* **1. Meteorology textbooks.**—*G.T.*

A4. HANDBOOKS—MANUALS

See also: **Met. for artillery, 12.7–129.**

12.7–16 551.5(02):629.13

§Great Britain. Meteorological Office, **Handbook of aviation meteorology.** London, H. M. Stationery Office, **1960.** 395 p. 114 figs., 26 plates, 12 tables, 32 refs. Price: 25 sh. **DWB, DLC** (TL556.G67)—The book is intended to be used as a textbook for pilots and navigators at flying training schools. The scope of the book is extremely wide. It is divided into five parts headed as follows: I. Physical principles; II. Meteorological observations—their making, dissemination and charting; III. Synoptic meteorology; IV. Meteorological organization and V. Climatology. The level of the book is such that no great knowledge of mathematics is required. All the main aspects of meteorology are covered. There are in addition several chapters of particular interest to airmen, such as the chapters on ice accretion, the unexpectedly short chapter on the characteristics of high-altitude flight, and a chapter which contains brief descriptions of the meteorological conditions affecting the major air routes. In addition several borderline subjects such as the selection and design of aerodromes and the ducting of radio waves near the ground are treated briefly. *Subject Heading:* **1. Aviation meteorology handbooks. I. Crossley, A. F.**—*R.B.*

12.7–17 551.501.1:551.507.352(02)

U. S. Air Weather Service, **Weather reconnaissance observations.** Its *Manual* 195–31, Dec. 1, **1959.** 87 p. 5 figs., charts, appendices. **DWB** (M(055)U58am)—An extensively illustrated and tabulated manual prescribing the standard weather observing techniques and procedures for the use of aerial reconnaissance weather forecasters. It consists of instructions for making and recording weather observations from aircraft, including the use of necessary charts, tables and nomograms. *Subject Headings:* **1. Weather reconnaissance observation techniques 2. Observers manuals.**—*I.S.*

12.7–18 551.508(02) 551.46:018(02)

Gidrometeorologicheskie pribory. [Hydrometeorological instruments.] Moscow, Vsesoiuznoe Ob"edinenie Tekhnopromimport, [**1959?**]. 159 p. photos. Title-page and text in Russian, English, French, German and Spanish. **DWB** (M08 G453gi)—A descriptive manual of Russian meteorological, aerological and hydrological instruments for measuring, collecting or sampling. The use, construction and operation, the dimensions, and a photograph of each unit are presented. Russian, English, German, French and Spanish descriptions are given for each unit. Among the instruments described and illustrated are the Thermoelectric Actinometer AT-50, Pyranometer P-3X3, Albedometer AS-3X3 and AP3X3, Universal Sunshine Recorder GY, Hand Cup Anemometer MS-13, Hand-Vane Anemometer ASO-3, Mercurial Barometer SP, 2P and KP; Tooth Comb Radiosonde RZ-049; Aerometeorograph SM-43 and Bathythermograph TB-52, etc. *Subject Headings:* **1. Instrument manuals 2. Meteorological instruments 3. Hydrological instruments.**—*E.Z.S. & M.R.*

12.7–19 550.1:551.468(02)551.588.1(02)

Putnam, William C.; Axelrod, Daniel I.; Bailey, Harry P. et al. (*all, Univ. of Calif., L. A.*), **Natural coastal environments of the world.** Los Angeles, **1960.** 140 p. 67 figs., (mostly photos), 3 maps (fold. in color, in pocket). "Prepared under contract Nonr-233(06), Nr 388-013 between Office of Naval Research and the Univ. of California." **DWB** (551.36 P993na)—This handbook is styled for, and the emphasis is placed on, the aspects of coastal classification appropriate to the training and needs of photointerpreters and persons concerned with the preparation of terrain analyses. Brief descriptions of each class of landform, climate, and vegetation are given. Three maps are included showing in color and symbol the distribution of the classes of coastal landform, climate and vegetation, respectively. Among the figures of interest to meteorologists is a graphic representation of moisture provinces and effective precipitation. *Subject Heading:* **1. Coastal zone classification handbooks. I. McGill, John T.**—*E.Z.S.*

A5. POPULAR SCIENCE BOOKS

See also: **Climat.** (Klado), 12.7–420.

12.7–20 551.5(023):551.586:63

Smith, L. P. (*Met. Office, London*), **Weathercraft.** London, Blandford Press, **1960.** 86 p. figs., photos. **DWB** (MS564we). Review in *World Meteorological Organization, WMO Bulletin* 9(4):236, Oct. **1960.**—This book is aimed at the intelligent amateur or older school pupil and sets out to suggest a series of simple experiments to illustrate the elementary facts of everyday weather. These experiments are chiefly concerned with the climate experienced by human beings and plants and are mainly conducted out of doors. The approach is novel in a book at this level and the text is very readable. The book is divided into three parts. Part I, The weather in general, deals mainly with methods of observing and recording the results. Part II, The weather in particular, deals with such items as local variations of frost, soil temperatures, rainfall variations within a garden, and the water balance of soils. Part III, The weather in harness, discusses various aspects of making the most of the weather in the growing of plants. Subjects covered are; growth under glass, fighting the frost and the art and science of watering. *Subject Headings:* **1. Simple weather experiments 2. Weather and gardening 3. Elementary textbooks.**—*R.B.*

A6. WMO—IGY

WMO

See also: **Second meeting of WMO. Comm. for Agric. Met.** (Hrbek), 12.7–95.

12.7–21 551.5:595.72:632.72

Langlo, K., **Meteorology helps to fight the desert locust.** *World Meteorological Organization, WMO Bulletin,* 8(4):184–185, Oct. **1959.** photo. **DWB**—A short report of the sixth session of the FAO Desert Locust Control Committee which met in Rome from June 29 to July 4, 1959 to consider the locust control problem. The project is to be assisted from the newly created United Nations Special Fund. During the discussion a number of important meteorological aspects of the project were brought out. It was pointed out that weather phenomena had major influences on locust behavior and hence upon the dynamics of locust plagues and the possibilities of more effective control measures. The Committee included meteorological research under its program, and agreed to strengthen the existing reporting and forecasting procedures for locust control purposes. *Subject Headings:* **1. Desert meteorology 2. FAO Desert Locust Control Committee 3. Locust control.**—*I.S.*

12.7–22 551.5:06.044

Daking, C. W. G. **World Meteorological Organization; the twelfth session of the Executive Committee.** *Meteorological Magazine,* London, 89(1,059):264–266, Oct. **1960. DWB, DLC**—This is a short report of the activities of the Twelfth Session, the high light of which was the combined ceremony to celebrate the tenth anniversary of WMO and the inauguration of the new headquarters building. *Subject Headings:* **1. WMO Executive Committee meetings.** —*R.B.*

12.7–23 551.5:629.13:06.045

World Meteorological Organization. Commission for Aeronautical Meteorology, **Abridged final report of the Second Session, Montreal, Sept. 1–29, 1959.** *World Meteorological Organization, [Pub.] WMO,* No. 91.RP.38, **1960.** 2 vol. **DWB** (M(06) W924p)—The abridged final report of the second session of the Commission for Aeronautical Meteorology (held in Montreal Sept. 1–29, 1959) which was held, in part, simultaneously with the fifth session of the Meteorology Division of the International Civil Aviation Organization consists of two volumes. Vol. I covers those matters dealt with by the Commission in its separate meetings. It contains a list of participants, the agenda, a general summary of the work of the session, the resolutions and recommendations adopted by the session, and some pertinent annexes with appendixes containing the details of resolutions and recommendations. Vol. II covers those matters dealt with in simultaneous meetings with the Meteorology Division of the International Civil Aviation Organization. It consists of a brief history of the meeting and a list of participants. The report of the agenda is divided into sections. Sec. I reviews of ICAO Annex 3 and Pans-MET and WMO Technical Regulations, Sec. II, Regional Planning: Sec. III, Technical Matters; Sec. IV, Recapitulation of recommendations relating to meteorology made by previous ICAO Meetings. *Subject Heading:* **1. WMO. Aeronautical Meteorology Commission meetings.** —*E.Z.S.*

12.7–24 551.5:06(a):629.13

Petrenko, N. V., **Resheniia Vtoroĭ sessii Komissii aviatsionnoĭ meteorologii Vsemirnoĭ meteorologicheskoĭ organizatsii.** [Resolutions of the Second Session of the Aeronautical Meteorology Commission of the WMO.] *Meteorologiia i Gidrologiia,* Moscow, No. 7:56–60, July **1960. DWB, DLC**—The recommendations of this session held in September 1959 are outlined in detail. *Subject Heading:* **1. WMO Aeronautical Meteorology Commission meetings.** —*R.B.*

IGY

See also: **Hydrobiol. measurements on Drifting Station Bravo** (Alpollonio), 12.7–31; **Byrd Station** (Morris, Peters), 12.7–32; **Antarctic Met.** (Alt), 12.7–33; **Electron density in ionosphere during IGY**, 12.7–150; **Geomag. rapid variations obs. during IGY**, 12.7–177.

12.7–25 551.5:550.3:061.3 **551.506.22:378**

Berkner, Lloyd V., **International Geophysical Year. Transcript of material presented to to the resident students at the Industrial College of the Armed Forces (Jan. 27, 1959).** Wash., D. C., Industrial College of the Armed Forces, **1958–1959.** 63 p. illus. Photostat of typescript. (*Publication*, No. L59–97). **DWB** (551 B153in)—Berkner's lecture covered, in general terms, the work and findings of most of the projects of the IGY. He noted that this synchronized study of earth and atmosphere was so stimulating that scientists wished to continue many of their joint pursuits. He noted that a weather map for the Antarctic had been produced and that a great deal had been learned about global circulation. He explained the organization of IGY and the International Council of Scientific Unions. Copies of photographs covering all of the aspects of his lecture included installation equipment, solar corona, atmospheric conditions, rockets and satellites. *Subject Headings:* **1. International Geophysical Year, 1957–1958 2. International Council of Scientific Unions.**—*E.Z.S.*

12.7–26 551.5:550.3(98/99) **551.506.22**

Tolstikov, E. I. (*Dept. Dir. Northern Sea Route Administration of U.S.S.R.*), **The Arctic and Antarctic Programme of the International Geophysical Year.** *International Union of Geodesy and Geophysics, 11th General Assembly, Toronto, Sept. 1957, Comptes Rendus*, pub. **1958.** p. 79–85. **DWB** (M(06) I611g)—An account is given of Soviet efforts to study the Arctic and Antarctic. From the beginning, the Soviet Union has been interested in the Polar Regions. Since World War II, the investigation of the central Arctic has been greatly extended. In the central part of the Arctic basin, a large water trench, 4000 m deep was discovered. The data obtained about terrestrial magnetism is of great interest to the scientists. At the moment, the drifting stations and other polar stations are carrying out observations for IGY. Seven different scientific groups are taking part in the investigations. *Subject Headings:* **1. IGY Antarctic program 2. IGY Arctic program 3. Arctic 4. Antarctica.**—*A.H.K.*

12.7–27 **551.513.2**

§Defant, Fredrich, **Investigations on the detailed structure of the atmosphere in Northern Hemisphere mid-summer (July 15–20, 1957, IGY-Data).** International Institute of Meteorology, Univ. of Stockholm, Contract AF 61(514)-963, Technical (Scientific) Note No. 5, Sept. 1, **1959.** 92 p. 28 figs., tables, eqs. **DWB** (M(051) I61tn)—A study of the general circulation of air masses in the Polar Region is presented. It is observed that between the equator and the pole there is no continuous tropopause, instead there are the polar front and subtropical jet air masses as well as the polar, the mid-latitude and tropical spaces. The study provides an excellent working tool in any three dimensional analysis of the atmosphere. It is indispensable in the analysis of the average values of temperatures in the different layers of the characteristically differing atmospheric spaces. The report covers world wide observations from the equator to the pole and upwards from the earth surface to about 25 km above. *Subject Headings:* **1. Atmospheric circulation 2. Northern Hemisphere circulation.**—*N.N.*

12.7–28 **551.506.22:551.594.6** 523.164.32

*Nagoya, Japan. Univ. Research Institute of Atmospherics, **IGY data on atmospherics, whistlers and solar radio emissions, Vol. 2–3, Jan. 1–June 30 and July 1–Dec. 31, 1958.** Issued Feb. and June **1959.** About 250 p. each. Entirely tables. "Compiled by the Research Institute of Atmospherics, Nagoya Univ." (For abstract on Vol. 1, *see* 10.9–41, Sept. 1959, *Met. Abs.*)—The contents are as follows: 1. reports of atmospherics and whistlers, sferics network during IGY and operating schedule; 2. atmospheric average intensity, integrated intensity of atmospheric radio noise, monthly average and SEA and sudden enhancement of atmospherics; 3. intensity of atmospheric radio noise, hourly value: db(luv/m=0 db), (median intensity during 10 min from 50 min to 00 min in each hour); 4. atmospheric noise recording (WMO, Recommendation 40, 1957-CAe), whole year of 1958 between lat. 34°50′N and long. 137°22′E; 5. monthly return for narrow sector bearing (the same as above); 6. atmospheric radio noise data by statistical method, noise field intensity and cumulative amplitude probability distribution in % and diurnal variation of noise intensity; 7. sferics fixes and wave-forms of atmospherics (only in December for three different stations); 8. whistler data, 8 classified designators by whistler, magnitude of the dispersions (185 p.) and 9. solar radio emissions, intensity and polarization at frequencies of 9400, 3750, 2000 and 1000 Mc/s, flux density. *Subject Headings:* **1. IGY sferics networks 2. IGY whistler program 3. Radio emission from sun.**—*K.C.*

A7. ARCTIC—ANTARCTICA

ARCTIC

See also: **Magnetic disturbances, Arctic** (Nikol'skiĭ), **12.7–171; Winds and visibility, Northwest Territories** (Longley), **12.7–444.**

12.7–29 91.04(984) **551.508.822**

Gröndahl, Erkki (*Vaisala Oy, Radiosonde Technician*), **Väisälä sounding system in IGY service at Murchison Bay in North-East Land.** *Vaisala News*, Helsinki, No. 3:7–8, Oct. **1959.** 3 photos. **DWB, DLC**—A short account of the Swedish-Finnish-Swiss expedition to North-East Land, where Vaisala sounding equipment was used for daily PTU and wind soundings. The expedition started from Norway in July 1957, consisting of 8 members from Sweden, 3 from Finland and 2 from Switzerland. The observation station was established at the northwest corner of the island, lat. 80°03′N long. 18°15′E. The Vaisala sounding system was adopted for aerological observations. A total of 874 soundings were made during the 13 months at Murchison Bay. The mean recording height was 18.5–19 gpkm. Numerous photographs of meteorological activities are included. *Subject Headings:* **1. Väisälä sounding system 2. Sounding equipment 3. Aerological observations 4. IGY aerological program 5. Murchison Bay, North East Land, Spitsbergen.**—*I.S.*

12.7–30 551.326.7:**551.578.46**(268)

*Iakovlev, G. N., **Snezhnyĭ pokrov na dreĭfuiushchikh l'dakh Tsentral'noĭ Arktiki.** [Snow cover on drifting ice in the Central Arctic.] *Problemy Arktiki i Antarktiki*, Leningrad, No. 3:65–76, **1960.** 3 figs., 8 tables, 10 refs. **DWB**—Snow cover has an important role in the formation of hydrometeorological processes due to variation in heat exchange between the ocean and atmosphere through ice. Presence of snow of different thickness over the ice surface affects the thermal processes. Specific studies of snow cover were made from 1937 to 1957 on various drifting stations "North Pole" (1 to 5) and during the expedition of the ice breaker "Sedov" (1937–40). The thickness of the snow cover is tabulated for different conditions and profiles of ice formation for different months at different polar stations taking into account changing density of snow. The appearance and thawing of snow is discussed with tabulated data and graphical illustrations. The discussion concludes with an analysis of thermal effect of snow cover on temperature variations in ice covered and uncovered by snow. *Subject Headings:* **1. Snow cover influences 2. Ice effects on thermal processes 3. Arctic Ocean.** —*N.P.S.*

12.7–31 **551.501.9**:551.326.7:551.46:576.8(268)

Alpollonio, Spencer (*Yale Univ.*), **Hydrobiological measurements on IGY Drifting Station Bravo.** *American Geophysical Union, Transactions*, 40(3):316–319, Sept. **1959.** 2 figs. **DWB**—It appears that the Arctic Ocean, although comprising 1/23 the area of all oceans, contributes only about 1/1000 of the total oceanic production of small plant and animal life. Even if the paucity of sunlight penetrating the Arctic ice pack did not limit phytoplankton growth, the poverty of the Arctic Ocean in nitrate and phosphate nutrients would still make its productivity level one of the lowest in the world. *Subject Headings:* **1. Oceanographic chemistry 2. Arctic oceanography 3. Marine biology 4. IGY Drifting Station Bravo 5. Arctic Ocean.**—*E.Z.S.*

ANTARCTICA

See also: **Met. of glacier slope, East Antarctica** (Gusev, Rusin), 12.7–423.

12.7–32 550.3:551.506.22:061.3(99)

*Morris, Wesley R. and Peters, Norman L. (*both, U. S. W. B.*), **Byrd Station (Inside Antarctica No. 5).** *Weatherwise*, Boston, 13(4):162–165, Aug. **1960.** 2 tables, 2 photos. **DWB**—On the broad, wind swept snow plateau of Marie Byrd Land at 80° south and 120° west is the site of the second U. S. post established for the U. S.-IGY program. The gathering of meteorological data began in 1957 and continued in 1958 and 1959. This data is given in tables. The article describes in detail some of the difficulties experienced during the expedition as well as the phenomenon typical to Antarctica. *Subject Headings:* **1. Meteorological data 2. U. S. IGY program 3. Marie Byrd Land, Antarctica.**—*A.H.K.*

12.7–33 551.5(99) 551.582(99) 551.585(99)

Alt, J. (*Météorologie Nationale, Paris*), **Quelques considérations générales sur la météorologie de l'Antarctique.** [Some general considerations on Antarctic meteorology.] *La Météorologie*, Paris, Ser. 4, No. 57:17–41, Jan./March **1960.** 16 figs., 3 tables, 8 refs. English, Spanish and Russian summaries p. 17. **DWB**—During the IGY sufficient synoptic weather reports were available to attempt a study as a whole the meteorology of the Antarctic continent. After recalling some geographical features of the South Polar region, the author first reviews the distribution and the variations of various meteorological elements. The air temperature near the ground has a typical annual variation, it decreases very quickly at the end of summer, increases still quicker in spring, but remains nearly constant during the winter months. The annual temperature amplitude is important and reaches 30°C in certain regions. Strong temperature variations are observed, sometimes increasing by 20°C in a few hours. In the interior of the continent very strong temperature inversions occur in the first hundred meters above the surface; inversions of more than 20°C are common, and an increase of 38°C within 350 m has been noted. A schematic chart gives the distribution of the mean temperatures. The atmospheric pressure seems to have a double annual oscillation with a minimum at the time of equinoxes and a maximum at the time of solstices. The author ends the first part of the paper with some comments on surface and upper air winds and on cloudiness and precipitation. The second part deals with Antarctic synoptic meteorology. Difficulty of synoptic analysis in the Antarctic is then emphasized, the mean reason being the existence of a thin layer of very cold air above the snow surface. Provisional conclusions concerning the general circulation are presented. Warm air advections and cold outbreaks seem to occur respectively over particular areas. Depressions with complete frontal systems may cross the entire continent. Although generally observed above coastal regions, jet streams may occasionally be detected far inland. This study enabled the author to subdivide the Antarctic into 5 distinct climatic regions, of which he gives the principal characteristics. *Subject Headings:* **1. Climate of Antarctic 2. Antarctic synoptic meteorology 3. Antarctic climatic classification 4. Antarctica.**—*A.V.*

12.7–34 551.524(99)

†*Hisdal, V., **Temperature.** *Norwegian-British-Swedish Antarctic Expedition, 1949–1952, Scientific Results*, Vol. 1, (Meteorology I), Pt. 2, Surface Observations, Section C, issued Oslo, Norsk Polarinstitutt, **1960.** p. 125–181. 35 figs., 16 tables, 24 refs. **DWB**—A detailed study of surface observations of temperature. Descriptions of instruments and methods of observation precede a discussion on the temperature regarded first as a separate element and then in connection with other elements. The influences on the surface air temperature of variations in wind and cloudiness are illustrated by characteristic examples. The factors considered are: change of cloud amount, wind direction and speed. The author avoids automatic correlations because of parallel variations. Results are given for the winter half year and summer half year. It is found that for moderate winds, the mean temperature deviation brought about by the formation and the break up of surface inversions varies nearly linearly with the wind speed. The same assumptions seem to suggest that the advective effect is approximately constant for wind speeds exceeding 14 knots. *Subject Headings:* **1. Antarctic temperature data 2. Antarctica.**—*E.Z.S.*

12.7–35 551.510.534(99) 551.510.41:546.214(99)

*Wexler, Harry; Moreland, W. B. and Weyant, W. S. (*all, U. S. W. B., Wash., D. C.*), **A preliminary report on ozone observations at Little America, Antarctica.** *Monthly Weather Review*, Wash., D. C., 88(2):43–54, Feb. **1960.** 14 figs., 6 tables, 13 refs. **DWB, DLC**—Summaries of ozone measurements made at Little America, Antarctica during 1957 and 1958 re presented. Data include both total ozone observations made with a Dobson Ozone Spectrophotometer and surface ozone concentrations measured with the automatic ozone ecorder developed by Regener. Wind and ozone roses were constructed to examine the variation of surface ozone with wind direction, and in addition the net meridional transport of urface ozone was captured for each month for a year. The computed northward transport f surface ozone during the winter months of June through Sept. suggests a model for atmospheric circulation in the Antarctic. Assuming no ozone is created or destroyed by photochemical or other means during this dark period and that Little America is representative of its atitude, steady-state conditions require that the low-level outflow of ozone be compensated by inflow at other levels. Both the lower stratospheric circumpolar jet inhibiting meridional ransport and the stability of the Antarctic stratosphere inhibiting downward vertical transport ead us to ascribe the principal ozone influx to the troposphere above the surface layer. Computations of the tropospheric ozone concentrations required to replace the low level loss of ozone, using Rubin's values for the vertical distribution of the tropospheric mass transports, re in good agreement with the observations made by ozonesonde at Halley Bay. It thus ppears that some of the ozone manufactured in the sunlit stratosphere of lower latitudes which enters the troposphere through the tropopause gap associated with the mid-latitude jet tream is transported into the Antarctic by winds of the vigorous winter storms which move round and into the continent, and finally sinks and then flows northward again as part of the to 3 km thick surface layer. *Subject Headings:* **1. Ozone in Antarctic 2. Ozone in troposphere 3. Little America, Antarctica.**—*Authors' abstract.*

12.7–36 551.579:551.326.7(269,99)

Kunetskiĭ, V. N., **O prichinakh anomalii gidrologicheskikh uslovii zaliva Olaf-Priuds Antarktika).** [Causes of anomaly in hydrological conditions of the Olaf Prudes Bay (Antrctica).] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia,* 91(4):356–358, uly/Aug. **1959.** 13 refs. **DLC**—The surface of Olaf Prudes Bay was, in Jan. 1957, completely ree of floating ice. The surface waters were strongly warmed while the deep waters were highly cooled; the temperature of the former at 68°30′S lat. was 3°C. Considerable warming was found in the subsurface waters; the isotherm of 2°C passed between stations 180-189 at a depth of 50.75 m. The layer of sudden jump was at a depth of 250–400 m and the temperature was below −1.9°C and the salinity was 34.46–34.54%. Normally this warm water is situated t 50°S lat. or 2000 km farther north. These anomalies of Olaf Prudes Bay are explained by he existence of stationary polynia which are constant throughout the year. In monsoon egions the polynia have a tendency to close up with change in the wind direction. In summer perceptible cooling and salinification of the water both at the surface and at some depth occur. n non-monsoon regions the stationary polynia do not tend to close up in summer. In the ummer there is maximum heating at the surface while intense cooling and salinification is ttained with depth. N. N. Zukov has shown to what extent surface water in ice regions of igh latitudes can warm up in the absence of ice. The occurrence of constant polynia in Arctic waters and in Antarctica, in the Davis Sea, in Olaf Prudes Bay and in Lütsow, Holm Bay, and the hydrobiological factors indicating the presence of permanent polynia are discussed. *Subject Headings:* **1. Hydrologic regime 2. Olaf Prudes Bay, Antarctica.**—*I.L.D.*

12.7–37 551.324.43(99)(047)

Kotlaiakov, V. M., **Doklad avstraliĭskogo gliatsiologa F. Lëve v Institute geografii AN SSR.** [Report of Australian glaciologist F. Loewe at the Institute of Geography of the U.S.S.R. Academy of Sciences.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geog.,* No. 1:160–162, an. **1960. DWB**—Comments on the report of Loewe who concluded that the ice on the Antarctic mainland is increasing. The author notes that a general warming-up is in progress—hat sea level is rising, temperatures appear to be higher and that as a result Antarctic ice should be melting. *Subject Headings:* **1. Antarctic glaciological studies 2. Antarctica. I. Loewe, Fritz.**—*E.Z.S.*

A8. CONFERENCES—SYMPOSIA

See also: **Aerodynamic capture of particles** (Richardson, *ed.*), 12.7–1; **Met. and hydrol. studies, India,** 12.7–3; **WMO. Comm. for Agric. Met., Warsaw** (Hrbek), 12.7–95.

12.7–38 551.58:061.3

Anapol'skaia, L. E. and Gandin, L. S., **Soveshchanie po prikladnoĭ klimatologii.** [Meeting on applied climatology.] *Meteorologiia i Gidrologiia*, Leningrad, 2:69–70, Feb. 1959. **DWB, DLC**—A report of the proceedings of a conference on applied climatology held at the Principal Geophysical Observatory on Oct. 27–31, 1958. Twenty-two papers were presented; they fell into the following four main groups: construction, medical, marine and energy resources climatology. Individual papers dealt with the computation of the heat exchange of buildings, classification of the U.S.S.R. on the basis of types of dwelling construction as determined by the heat regime, characteristics of climate relevant to the planning of health resorts, climate and living conditions (dwellings, clothing, foot wear), effect of radiation climate upon the operation of solar installations, use of climatic data to determine the wind and wave regime of seas and oceans, etc. *Subject Headings:* **1. Applied climatology conferences 2. U.S.S.R.**—*I.L.D.*

12.7–39 551.5:550.3 551.510.535

Stagg, J. M., **Has meteorology become too professionalized? (Presidential address delivered before the Royal Meteorological Society on April 20, 1960.)** *Royal Meteorological Society, Quarterly Journal*, 86(369):295–300, July 1960. **DWB, DLC**—The speaker emphasizes, as did his two immediate predecessors in their presidential addresses, the need for meteorologists to take more interest in the higher atmosphere and the physics of the earth. At least interest should be extended from the past 35–40 km upper limit to at least 80 km, and real study made (not superficial correlation) of relations between events in the ionosphere (>80 km) and the circulation of the atmosphere. The bulk of the paper is devoted to a discussion of mechanisms in the ionosphere which are meteorological by their very nature and hence worthy of study by meteorologists. If any other benefits result, such as in solving problems of lower level circulation, that would be a worth-while bonus. In conclusion, he warns on the one hand against too rigorous or professional compartmentalization and on the other hand, too careless attempts at proving inter-relations between geophysical phenomena. *Subject Headings:* **1. Interdisciplinary research 2. Meteorological-geophysical relationships 3. Ionospheric research.**—*M.R.*

12.7–40 551.5:656:003.1(573)

Freĭdin, I. L., **Konferentsiia po razvitiiu proizvoditel'nykh sil Vostochnoĭ Sibiri.** [Conference on the development of the productive forces of Eastern Siberia.] *Problemy Arktiki i Antarktiki*, Leningrad, No. 3:101–108, 1960. **DWB**—The subjects of the regional conferences of members of the Academy of Science, State Planning Commission, Arctic Inst. and local scientific and industrial representative held in Krasnoyarsk, Irkutsk, Yakutsk, Chita and in other Siberian cities, are briefly reviewed with respect to further development of natural resources and economical transportation. Special attention is given to export of industrial, mineral, agricultural, and forest products and to import of machinery, industrial equipment and other products for use in Eastern Siberia and the Arctic. Further development of water power for industrial purposes for railroad electrification, and control of river navigation are discussed from engineering and economic angles. The problems of improvement of river shipping and loading facilities for lumber export through navigatable rivers and the Northern Sea Route are discussed in connection with reconstruction of ports in the Arctic. The discussion of the agriculture section is related to the import of phosphates from European territory of the U.S.S.R. by land, sea and river transport or by a combination of these types. Transportation of diamonds, in view of remote and isolated mines, was limited to motor and airplane transport. The results of the conferences are given with conclusions on the following aspects of the problem: (1) development of the Northern Sea Route, especially in connection with the export and import through the Yenisei River; (2) development of transportation and economical onnection with separate and remote regions of the Arctic; (3) coordination of complex probms on the economics of the Northern Sea Route in respect to the mass transportation of loads onstruction of new ships and icebreakers, ports, loading facilities and improvement in river pproach to the sea route). It was also suggested that an extensive study be made of e geographic complexes of the northern regions of Eastern Siberia for national use of transortation of all types and wide publication of work on the problems of economics and expansion. *ubject Headings:* **1. Natural resources conferences 2. Siberia.**—*N.P.S.*

12.7–41 551.586:615.834:061.3

Undt, W., **Arbeitstagung "Bioklimatologie im Kur- und Bäderwesen" vom 3. bis 5. März der Deutschen Akademie der Wissenschaften, Berlin.** [Seminar on Bioclimatology in ealth Resort and Spa Management, March 3–5, at the German Academy of Science, Berlin.] *etter und Leben*, Vienna, 11(1):14–20, 1959. **DLC**—In this detailed report on the proceedings the meeting on the role of bioclimatology in health and bathing resorts, held under the ispices of the Meteorological Society of the German Democratic Republic, is contained tensive summaries of the papers delivered and of the accompanying discussions. The apers included the following: the definition of the concept "local climate" (W. Boër); the nportance of the local climate of tuberculosis health resorts (H. Zenker); mortality and eather situations (G. Hentschel); air pollution and resort climate (H. Mrose); natural dioactivity of aerosol (E. Pfeiffer); possible biological effects of atmospheric electricity, imatic therapy and method for determining objectively its effects (H. Jordan). *Subject eadings:* **1. Bioclimatology seminars 2. Health resorts 3. Germany.**—*I.L.D.*

A9. SOCIETIES—INSTITUTIONS—SERVICES

See also: **Met. aid in agric. aviation** (Roldán Seminario), 12.7–80; **Annual departmental report, Hong Kong Royal Obs.,** 12.7–267.

12.7–42 551.579:371.26(47)

Khzmalian, K. A., **Usilivshaiasia propaganda gidrometeorologicheskikh znaniĭ, (Obzor azet za avgust-oktiabr' 1959 g).** [Increasing publicity of the hydrometeorological sciences: survey of newspapers from August–October 1959.] *Meteorologiia i Gidrologiia*, Leningrad, o. 2:51–53, Feb. 1960. **DWB, DLC**—A detailed survey of Soviet metropolitan and local ewspapers shows that more space is given recently to publicize the importance of hydroeteorological knowledge among the population of the U.S.S.R. During August–October 1959 out 200 articles have been published in papers printed in the Russian language. The thor lists the topics of the most important articles (with the name and date of the paper) ritten by specialists of the Hydrometeorological Service in a popular form. He adds that this creased publicity is not only the result of an increased interest shown by newspaper readers, t it also is due to a greater activity of the Hydrometeorological Service workers in the reading of hydrometeorological knowledge. *Subject Headings:* **1. Hydrologic progress Popular hydrology 3. U.S.S.R.**—*A.M.P.*

A10. EDUCATION—HISTORY—BIOGRAPHY—BIBLIOGRAPHY

12.7–43 550.3:331.7

Sutton, Sir Oliver Graham (*Director General, Met. Office*), **Gassiot Fellowships in Geoysics:** *Meteorological Magazine*, London, 89(1054):129–130, May 1960. **DWB, DLC**—The llowship for work in geomagnetism and seismology is designed to attract university men in id-career. Though measurements and records were made in these disciplines at Lerwick, skdalemuir and Kew, lack of man-power delayed their interpretation and publication. It is pected that the Gassiot Fellowship will provide the wherewithal for these tasks. *Subject eadings:* **1. Gassiot Fellowships in Geophysics 2. Geophysics fellowships.**—*E.Z.S.*

12.7–44 55:378.962

Shrock, Robert R. (*Dept. of Geology & Geophysics, M. I. T.*), **Earth Science Center at assachusetts Institute of Technology.** *American Geophysical Union, Transactions*, 40(2):

120–122, June **1959.** fig., 5 refs. **DWB, DLC**—A description of the Earth Science Center being organized and implemented at Massachusetts Inst. of Technology. It is noted that the overall program of the Center will attempt to integrate and unify instruction and research in such a way that any graduate with good training in mathematics, physics and chemistry and training or interest in earth science, can proceed to graduate work with many choices as to the field or fields in which he can train himself. The instructional and research program of the proposed Center for Earth Sciences at MIT is expected to produce well-rounded physical scientists with some knowledge of each of the principal earth sciences and considerable knowledge of at least one of these. *Subject Headings:* **1. Educational facilities 2. Earth science education 3. Massachusetts Institute of Technology.**—*E.Z.S.*

12.7–45 551.5(213):378.4(969)

Ramage, C. S., **Tropical meteorology: research and teaching.** Hawaii. Univ. Institute of Geophysics, Contract AF 19(604)-1942, (Scientific) Final Report, May **1960.** 27 p. 7 figs., tables, 21 refs. **DWB** (M(055) H389sc)—Contract AF 19(604)-1942 with the University of Hawaii, for research into the tropical meteorology of the Pacific and Far East, ran from 16 August 1956 to 15 March 1960. As well as investigations into problems of evapotranspiration typhoon development and movement, geostrophic winds, analysis of wind-weather relationships, forecasting of upper winds, and the compilation of a most extensive Pacific and Far East synoptic data file, the contract supported classes in Advanced Tropical Meteorology attended by experienced U. S. Government and SEATO meteorologists. The contract's signing marked the entry of the University of Hawaii into the meteorological field. When the contract ended the University was offering a B.S. in Meteorology and planned to start a graduate program in the fall of 1960. *Subject Headings:* **1. Meteorological education 2. Hawaii.**—*Author's abstract*

HISTORY

See also: **Magnetic declination observed by Martin Bylica about 1485** (Przypkowski), 12.7–182; **Phenology of Austria** (Reiss), 12.7–259.

12.7–46 551.5(09):84

Dufour, L., **Les écrivains et la météorologie: Emile Zola.** [Writers and meteorology Emile Zola.] *Ciel et Terre*, Brussels, 76(5/6):179–186, May/June **1960.** **DWB, DLC**—The work of EMILE ZOLA (1840–1902), French naturalist, includes interesting descriptions o atmospheric phenomena. The author mentions the descriptions of a storm at sea as seen from the store in **La Joie de Vivre,** of a storm squall in **La Terre,** of a snow storm in **La Bête Humain** and of the mistral in **Le Docteur Pascal.** The author reproduces a long excerpt from the nove **Une Page d'Amour** which almost constitutes a meteorological document. Each of the fiv parts of this novel ends with a description of Paris, with its ocean of roofs seen at differen hours, different seasons and under different atmospheric conditions. This excerpt proves tha ZOLA drew his picture of Paris under the rain by gathering his memories pell-mell, regardles of the likelihood of the whole. Indeed, the first part of the description is that of squall weather and the second, that of a depressionary rain, two different and clearly separate phenomena which cannot follow each other so closely in reality. Furthermore, ZOLA did no describe the facts as he really observed them, but he changed and exaggerated them to rende his description more intense and more effective. In the description of atmospheric phenomen ZOLA makes one think of HUGO. Both, carried away by their romantic imagination, hav systematically spoiled the descriptions that their evocative power could have rendered ver interesting. *Subject Headings:* **1. Meteorology in French literature 2. Zola, Emile.**—*A.V.*

12.7–47 551.5:061.6(09)(584.6

Verkhunov, V. M., **Meteorologicheskie issledovaniia v Kazani v XIX veke.** [Meteoro logical investigations in Kazan during the 19th century.] *Meteorologiia i Gidrologiia*, Mosco No. 10: 40–44, Oct. **1959.** ref. **DWB, DLC**—Meteorological studies, initiated in 1733 a Kazan, which later spread to other cities and universities, are reviewed in chronological orde up to 1912 with brief description of the main subjects of work and the names of investigato and organizers of the studies. The coordination of these studies for publication and th onstruction of new meteorological and physical stations are also outlined in this review. *ubject Headings:* **1. Meteorological investigations 2. Historical data 3. Kazan, Tatar epublic, U.S.S.R.**—*N.P.S.*

BIOGRAPHY

12.7–48 551.5:550.3:92

Kosiba, Aleksander (*Univ. of Wroclaw*), **Działalnośc naukowa Profesora Henryka Arctow-kiego.** [Henryk Arctowski's scientific work.] *Acta Geophysica Polonica*, Warsaw, 7(3/4): 50–281, **1959.** 8 figs. English summary p. 279–281. **DWB, DLC**—HENRYK ARCTOWSKI as born in Warsaw, July 1871 and died in Washington, D. C., Feb. 1958. He studied geology nd chemistry 1888–1893, and worked with SPRING at the Chemical Institute of the Liège niversity on the genesis of certain minerals in igneous rocks. This remarkable man prepared r participation in the Belgica Antarctic Expedition by taking special courses in glaciology, ceanography and meteorology under the aegis of the most outstanding teachers in these fields. n his return he prepared and edited the results of the expedition's findings in the field of eology, morphology, oceanography, glaciology and meteorology. ARCTOWSKI took up sidence in the U. S. in 1909, chief of the Science Division of the New York Public Library. e also served on numerous important international committees. He joined the Smithsonian stitute and was a staff member from 1939–1950. *Subject Headings:* **1. Biography of Henryk rctowski 2. Bibliography of Henryk Arctowski 3. Arctowski, Henryk.**—*E.Z.S.*

12.7–49 551.5:92 **551.521.13:551.524.3**

Abbot, Charles Greeley, **Dr. Henryk Arctowski's work with the Smithsonian Institution, ashington, 1939–1950.** *Acta Geophysica Polonica*, Warsaw, 7(3/4):309–310, **1959. DWB, LC**—HENRYK ARCTOWSKI worked at the Smithsonian Institution, Washington, D. C. from 39 to 1950. The Institute published his paper **On solar-constant and atmospheric tempera-re changes,** *Smithsonian Miscellaneous Collections*, Volume 101, Number 5, **1941.** In this per and other contributions, ARCTOWSKI gave evidence of the reality of correlation between lar variation and weather. *Subject Headings:* **1. Biography of Henryk Arctowski 2. Arctow-i, Henryk.**—*E.Z.S.*

12.7–50 551.5:92

Bilancini, R., **[Obituary of] Ernst Kleinschmidt.** *Rivista di Meteorologia Aeronautica*, ome, 20(3):47–48, July/Sept. **1960. DLC**—ERNST KLEINSCHMIDT—born 5 Sept. 1877, died Aug. 1959—was born in Wiesbaden. Although KLEINSCHMIDT was a meteorologist, he also ntributed to other physical sciences. He participated in the oceanographic research on the Princess Alice" in 1905, in atmospheric soundings made by balloons, and in testing various eteorological instruments and techniques. His research varied from limnology to seismology d geomagnetism. KLEINSCHMIDT introduced the teaching of meteorology into the schools, lped establish a network of meteorological stations and published a **Handbook of meteoro-gical instruments** in 1935. *Subject Headings:* **1. Obituary of Ernst Kleinschmidt 2. Klein-hmidt, Ernst.**—*E.Z.S.*

12.7–51 551.5:550.3:92

Pisharoty, P. R. (*Colaba Obs., Bombay*), **Dr. Nanabhai Ardesher Framji Moos** (1859–**36).** *Indian Journal of Meteorology and Geophysics*, New Delhi, 10(4):371–372, Oct. **1959.** oto. **DWB. DLC**—A note commemorating the occasion of the centenary of Moos in Oct. 59 and his pioneering services to meteorology in India. He was born on Oct. 29, 1859, aduated in engineering from the Poona College of Science in 1878 and in 1886 took his chelor of Science Degree with distinction at Edinburgh University. Back in India, he rved as Professor of Physics in the Elphinston College, Bombay. In 1896 he was appointed rector, Colaba (Bombay) Observatory, which post he held until his retirement in 1919. He ntinued his interest in meteorological, magnetic and seismological problems until his death March 12, 1936. **Colaba magnetic data 1846–1905,** a two-volume work, is cited as his out-nding contribution to terrestrial magnetism. *Subject Headings:* **1. Biography of Nanabhai desher Framji Moos 2. Moos, Nanabhai Ardesher Framji.**—*I.S.*

12.7–52 551.5:92

Thomas, J., **Obituary of André Prudhomme.** *La Météorologie*, Paris, Ser. 4, No. 57:4–6, Jan./March **1960.** **DWB**—Andre Prudhomme (1920–1959) engineer of the French National Weather Service disappeared on Jan. 7, 1959, while on duty in the Antarctic. He joined the O.N.M. in 1945, and participated in 1954, as head of the Meteorological section, in the mission in Adélie Land. He stayed for 3 years at Madagascar where he assumed the functions of head of the forecasting service. After his return to France he prepared a new Antarctic expedition within the framework of the IGY (1957–1959). His research included the study of the influence of air masses on the measurement of night sky brightness, the ascensional speed of radio-sounding balloons and the nature of solar phenomena capable of modifying the atmospheric circulation. *Subject Headings:* **1. Biography of Andre Prudhomme 2. Prudhomme, Andre.** —*A.V.*

12.7–53 551.583:581.056:92

[Obituary of] Edmund Schulman, 1908–1958. *Tree-Ring Bulletin*, Tucson, Ariz., 22(1/4):2–6, Dec. **1958.** port. Bibliography of Schulman's writings, p. 4–6. **DWB**—Edmund Schulman, Associate Professor of Dendrochronology and Managing Editor of the *Tree-Ring Bulletin*, died following a heart attack on the University of Arizona campus, Jan. 8, 1959. His career as a dendrochronologist and his contributions in this field are noted. *Subjec Headings:* **1. Obituary of Edmund Schulman 2. Schulman, Edmund.**—*I.S.*

12.7–54 52:551.5:92

Duginov, V. I., **Kurskiĭ samouchka-astronom i meteorolog Fedor Alekseevich Semenov.** [Selftaught astronomer and meteorologist Fedor Alekseevich Semenov, of Kursk.] *Meteorologiia i Gidrologiia*, Moscow, No. 6:41–44, June **1960.** photo., 5 refs. **DWB, DLC**—The life and scientific works of F. A. Semenov as discussed by different individuals, are reviewed by the author. Semenov was born on April 21, 1794 and died in 1873. From childhood he demonstrated great interest in natural phenomenon and scientific explanations. Most of his scientific knowledge was obtained by reading and through personal contact with educated people. In 1814 he computed the table for movements of certain planets and in 1823 he made a telescope for observation of large planets and the moon. For extensive scientific work and publication of the table on eclipses of the Moon and Sun he received the gold medal from the Geographic Society in 1856. *Subject Headings:* **1. Biography of Fedor Alekseevich Semenov 2. Semenov, Fedor Alekseevich.**—*N.P.S.*

12.7–55 551.5:550.38:9

Sutton, Sir Oliver Graham (*Director General, Met. Off., London*), **[Biographical Sketch of] Dr. J. M. Stagg.** *Meteorological Magazine*, London, 89(1058):221–222, Sept. **1960.** **DWB DLC**—Stagg retired from his post of Director of Services of the Meteorological Office on 7th Sept. 1960. He joined the Meteorological Office in 1924 after a brief spell as a school teacher In 1932 he led the British Polar Year Expedition to Fort Rae in the Canadian Arctic and later became Superintendent of Kew Observatory. During World War II he became Chie Meteorological Adviser to the Supreme Commander, Allied Forces, Europe and was involved in the D-Day forecasts. He was made an Officer of the Legion of Merit of the U. S. He late became Principle Deputy Director of the Meteorological Office and then Director of Services He has been President of the Royal Meteorological Society and General Secretary of the International Union of Geodesy and Geophysics. He was well known internationally for hi work on geomagnetism. *Subject Headings:* **1. Biography of J. M. Stagg 2. Stagg, J. M.**—*R.B*

Bibliography

12.7–56 551.5(675):01

†Note complémentaire sur les travaux météorologiques exécutés au Congo Belge, 1951-1954. [Supplement on meteorological activities in the Belgian Congo, 1951–1954.] *I.U.G.G. Bulletin d'Information*, 3(6):423–425, Nov./Dec. **1954.** bibliogs. **DWB**—A bibliography o the literature concerning climatology, radiation, atmospheric dynamics, aerology and synopti meteorology of the Belgian Congo. *Subject Headings:* **1. Bibliography on the meteorology o the Belgian Congo 2. Congo Republic.**—*E.Z.S.*

12.7–57 551.5(45):016

†**Les études météorologiques en Italie 1951 à 1953.** [Meteorological studies in Italy, 951–1953.] *I.U.G.G., Bulletin d'Information*, 3(6):426–436, Nov./Dec. **1954.** 105 refs. **WB**—The bibliography of 105 references is annotated and publications of general nature are dentified. Publications in each of the following areas are identified separately: synoptic neteorology; radiation and temperature; winds, water vapor, clouds and hydrometeors, limatology; instruments, procedures and methods of measurements, influence of various pecial phenomena and practical phenomena. *Subject Headings:* **1. Bibliography on the neteorology of Italy 2. Italy.**—*E.Z.S.*

B. APPLICATIONS

B1. AERONAUTICS

See also: **Handbook of aviation met.,** 12.7–16; **Second session of WMO Comm. for Aeronaut. Met., Montreal, 1959,** 12.7–23; **Second session of WMO Comm. for Aeronaut. Met.** (Petrenko), 12.7–24; **Met. aid in agric. aviation** (Roldán Seminario), 12.7–80; **Determination of atmos. turbulence spectrum from airplane soundings** (Ivanovskiĭ, Chermisin), 12.7–238; **Determination of vertical atmos. movements from records of accelerograph installed in aircraft** (Khachatrian), 12.7–239; **Aeronaut. climat. summaries, Lod Airport,** 12.7–425.

12.7–58 551.515.8:551.578.7:629.13

Harrower, T. N. S. and Evans, D. C., **Similarities of the meteorological situations in vhich aircraft were damaged by heavy hail.** *Meteorological Magazine*, London, 89(1052): 0–85, March **1960.** 3 figs., 4 photos, 7 refs. **DWB, DLC**—On two different occasions in ugust 1954 and 1958, two aircraft flights met similar meteorological situations. In the second ase the aircraft was at the height of 19,000 ft. Moderate hail was encountered causing extenive damage to the aircraft. There are many similarities in this incident to the first one. Each case occurred near a cold front, and in each case the wind was southwesterly. In Europe ail damage is related to slow moving fronts and shallow troughs of low pressure. If hail torm warnings are given to pilots, such dangers can be avoided. *Subject Headings:* **1. Hail lamage to aircraft 2. Hail storm warnings.**—*A.H.K.*

12.7–59 551.551:629.13

*†Donely, Philip (*Langley Aeronautical Lab., NACA*), **Digest of lectures given at DVL Deutsche Versuchanstalt für Luftfahrt) May 1957 on A survey of information pertaining to usts and gust-load statistics. 1957.** 59 p. 40 figs., 26 refs. **DWB** (M51 D681d)—The urpose of these lectures was to review information available in the U. S. for the benefit of German research and design groups. The entire field of gust loads is covered, including the neteorological occurrence of gusts, mechanism of atmospheric turbulence, response of airplanes, perational practices, etc. Diagrams on occurrence, intensity and dimensions of turbulence nd gust velocities (in terms of probability, altitude vs. flight distance), etc., are presented. *Subject Heading:* **1. Gust loads on airplanes.**—*G.T.*

12.7–60 551.5:629.13 551.584.2(480.7/8)

*Venho, S. N., **Aeronautical meteorological tables at Kuopio and Vaasa airports.** *Finland. Ilmatieteellisen Keskuslaitos, Toimituksia. Mitteilungen*, No. 49, **1959.** 20 p. mostly tables **WB, DLC**—Wind distribution at two Finnish airports, Kuopio (63°01′N, 27°48′E) and Vaasa 63°03′N, 21°45′E) as well as the temperature variations between Dec. 1, 1946 and Nov. 30, 956, are tabulated in this report. The tables also indicate the cloud conditions, the intensity f fog, mist, surface fog and haze. The Kuopio meteorological observations were made between Dec. 1, 1946 and Nov. 30th, 1956. These are included. *Subject Headings:* **1. Aeronautical neteorological data 2. Kuopio Airport, Finland 3. Vaasa Airport, Finland.**—*N.N.*

12.7–61 551.506.7:629.135.15

Reinhardt, Manfred, **Voli aerologici eseguiti durante le Gare nazionali di volo a vela, Rieti, 1959.** [Aerological flights during the National Gliding Contests at Rieti in 1959.]

Rivista di Meteorologia Aeronautica, Rome, 20(3):14–20, July/Sept. **1960.** 5 figs., 2 tables, 2 refs. Italian, French, English and German summaries p. 14. **DLC**—This is an account of the aerological observations made in the Rieti Valley, aboard the glider "Kranich III" of the Institut für Flugforschung der Deutschen Forschungsanstalt für Segelflug during the national gliding contests in 1959. The chief purpose was to ascertain the vertical thermal structure of the lower atmosphere. The data recorded during the ascent and descent of the glider, together with those gained by the preconvective sounding which was carried out every morning by plane, were worked out according to Gold's energetic considerations. *Subject Headings:* **1. Flight data 2. Glider flights 3. Thermal structure of lower atmosphere 4. Upper air observations 5. Rieti Valley, Italy.**—*Author's abstract.*

B2. ASTRONAUTICS

See also: **Items** 12.7–63 to 12.7–78; **Aerodynamics of upper atmos.,** 12.7–5; **Effect of ionosphere on Doppler shift** (Hibberd), 12.7–125; **Investigation of ionosphere using signals from satellites** (Chvojková), 12.7–126; **Outer radiation belt and solar proton obs. with Explorer VII** (Van Allen, Lin), 12.7–188; **Satellite-measured radiation** (Stuart), 12.7–189.

12.7–62 535.23:551.521.1:629.13

Press, S. James (*Douglas Aircraft Co., Inc.*), **An application of solar radiation to space navigation.** *Aero/Space Engineering*, N. Y., 17(11):51–54, Nov. **1958.** 2 figs., 9 refs., 35 eqs. **DLC**—The theory that the flux density, $F=(\epsilon\sigma AT^4)/(\pi D^2)$, of radiation from a surface of area A at a distance D from a radiating body is the radiant energy per second passing through a unit area, which is normal to the line of sight to the emitting surface has been investigated. The derivation of its mathematics is presented here in detail. The paper examines also the feasibility of determining the range that a space ship might travel, by means of a passive thermal radiation sensing system. The effect of the absolute temperature, T, the total emissivity of the surface, ϵ, and the Stephan-Boltzmann constant, are taken into consideration. The overall advantage of this study is that this system of space position determination with respect to the sun, by means of thermal conductors, will meet a useful application to the problem of space navigation. *Subject Headings:* **1. Space navigation 2. Solar radiation.**—*N.N.*

12.7–63 551.507.362.2

Brenner, J. L. and Latta, G. E. (*both, Stanford Research Institute*), **The theory of satellite orbits, based on a new coordinate system.** *Royal Society of London, Proceedings, Ser. A*, 258(1295):470–485, Nov. 8, **1960.** fig., 7 refs., 43 eqs. **DLC** (Q41.L7)—The co-ordinate system of King-Hele is refined and used to solve the equations of motion of a near-earth satellite, neglecting all perturbing forces except the oblateness of the earth. Besides the better-known effects (regression of nodes, precession or recession of perigee) it is found that the maximum latitude of the subsatellite point varies, and the rate of regression of the node varies by as much as 20% on either side of its mean value (when $e=0.2$). Validity of the analysis is not restricted to small eccentricities. *Subject Headings:* **1. Satellite orbit theories 2. King-Hele coordinate system.**—*Authors' abstract.*

12.7–64 551.507.362.2:533.6:521.312

Beletskiĭ, V. V., **Dvizhenie iskusstvennogo sputnika Zemli otnositel'no tsentra mass.** [Motion of an artificial earth satellite in relation to the center of masses.] *Iskusstvennye Sputnik Zemli*, Moscow, No. 1:25–43, **1958.** 7 figs., 4 refs., numerous eqs. **DLC.** Transl. into English issued in Artificial Earth Satellites, Vol. 1, issued N. Y., Plenum Press; London, Chapman & Hall, **1960.** p. 30–54. 7 figs., eqs. **DWB** (629.1388 A791ar)—With the aid of the relevant theoretical equations, the author examines the influences of moments of aerodynamic forces on the movement of an artificial earth satellite near the center of mass, the simultaneous influence of aerodynamic forces and regression of the orbit on the motion of an artificial satellite near the center of mass and the gravitational disturbances on the motion of a satellite near the center of mass. The motion of a satellite is comprised of undisturbed motion near the vector of kinetic moment (regular precession of satellite with dynamic symmetry) and of the secular precessional-nutational movement of the vector of kinetic moment itself. The secular motion of the vector of kinetic moment proceeds about the direction which varies with time near the perigee tangent if the effect of aerodynamic disturbances is greater than that of gravitational ones. If the effect of gravitational disturbances exceeds the aerodynamic ones, then the trajectory of the end of the vector of kinematic moments as a function of initial data can be of two types: a trajectory symmetrical to the plane of the orbit with the center in the center of aerodynamic precession and more or less compressed because of gravitational disturbances or a "gravitational" trajectory, i.e., a trajectory whose center lies close to the center of gravitational precession. In all cases there is a stability of motion relative to the orbit in the sense that the motion of the relatively regressing orbit differs little from the motion relative to the immobile orbit. *Subject Headings:* **1. Aerodynamic effects on artificial earth satellites 2. Orbital motions.**—*I.L.D. and author's conclusion.*

12.7–65 551.507.362.2:523.3

Buchheim, Robert W., **Artificial satellites of the moon.** *International Astronautical Congress, Rome, Sept. 17–22, 1956, Proceedings of the 7th Congress*, issued Rome, 1956. p.587–543. 33 figs., 8 refs., 23 eqs. **DLC** (TL787.I44)—In this paper the requirements for establishing artificial satellites of the moon are discussed. The orbit parameters of lunar satellites are considered and limits are derived for avoiding the fatal extremes of impact on the moon and recapture by the earth. Lunar satellite parameters are related to the initial conditions at the earth end of the transit trajectory to the moon. Sample transit trajectories and moon satellite orbits are presented. Computations of motion are based on an earth-moon model that represents the earth and moon as spheres rotating uniformly about their common center of mass. The magnitudes of effects due to factors neglected in this model are estimated. The problems of attitude stabilization during the earth-moon transit and of velocity adjustment near the moon are considered. Lunar satellite size and mass are related to visual magnitude, and approximate system weight requirements are estimated. *Subject Headings:* **1. Moon satellites 2. Moon satellite orbits.**—*Author's abstract.*

12.7–66 551.507.362.2:531.56

Lidov, M. L., **Soprotivlenie neorientirovannogo tela pri dvizhenii v razrezhennom gaze.** [Resistance of a nonoriented body during motion in a rarefied gas.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, 12:1524–1528, 1957. 2 figs., 3 refs., 28 eqs. **DLC.** Transl. into English in the corresponding number of its *Bulletin of the Academy of Sciences, USSR, Geophysics Series.* **DLC**—When a body moves in a free molecular current (particularly the case of an artificial earth satellite in the upper atmosphere) without any special orientation to the direction of motion, it will, under the action of accidental disturbances, rotate with a variable angular velocity relative to the center of mass. The analysis of an ideal nonoriented body permits the calculation of the mean resistance of such a body without calculating the resistance at individual angles of attack. In the general problem the exact determination of the coefficient of resistance of a sphere requires the computation of the quadrature as a function of the parameter. It is shown that in practice it is possible to resolve this integral in accordance with the parameter introduced and to compute only the first terms. The coefficient of resistance of a sphere is thus calculated by means of a simple formula and one tabulated function. Equations are developed for calculating, on the basis of kinetic gas theory, the heat exchange and aerodynamic forces acting upon a body for the case when the length of the free fall of the molecular current is greater than the characteristic size of a body, for computing the complete anterior resistance of a body, and for calculating the coefficient of resistance of a sphere. *Subject Heading:* **1. Satellite drag computation.**—*I.L.D.*

12.7–67 551.501.1:551.507.362.2

Instruktsiia po provedeniiu vizual'nykh nabliudeniĭ za iskusstvennymi sputnikami Zemli. [Instruction for visual observations of artificial earth satellites.] *Akademiia Nauk SSSR. Mezhduvedomstvennyĭ Komitet po Provedeniiu MGG (IGY), Informatsionnyĭ Biulleten',* No. 5:29–36, 1958. **DWB**—The task of a visual observing station is to note with an accuracy of 0°.1–0°.5 the position of one or two visible satellite orbits relative to the stars and to determine with an accuracy of 0.5 sec the instant of world time at which the satellite was at these points. In order to observe the satellite which travels with a speed of 1°/sec one or two "optical barriers," of 30 or fewer AT-1 tubes are placed along the meridian and along a vertical circle perpendicular to the visible orbit of the satellite. In these instructions the authors discuss in detail the conditions of observation, the selection of an area from where observations are to be made and the equipment, which is itemized (AT-1 tube, radio receiver, optical quadrant, etc.); the selection and preparation of personnel; setting up of the equipment for observation along the meridian and outside the meridian; work of the station during the time of observation; working up of the observations and reporting of the results; and the record of the work of the station or maintenance of a diary. Two appendices contain the codes for recording observational data of artificial satellites from observing stations in the U.S.S.R. and for the telegraphic transmission of information on the coordinates of artificial earth satellites at stations in the U.S.S.R. *Subject Headings:* **1. Satellite orbits 2. Satellite tracking 3. U.S.S.R.**—*I.L.D.*

12.7–68 **551.506.9:551.507.362.2**

*Gindin, E. Z.; Leikin, G. A.; Lozinskiĭ, A. M. and Masevich, A. G., **Opticheskie nabliudeniia iskusstvennykh sputnikov Zemli.** [Optical observations of artificial earth satellites.] *Akademiia Nauk SSSR. Mezhduvedomstvennyĭ Komitet po Provedeniiu MGG, Predvaritel'nye itogi nauchnykh issledovanii s pomoshch'iu pervykh sovetskikh iskusstvennykh sputnikov Zemli i raket,* No. 1:5–30, **1958.** 4 figs., 2+8 tables. English summary p. 21. **DWB**—The organization of optical observations of the artificial earth satellites was entrusted to the Astronomical Council of the Academy of Sciences of the U.S.S.R. Optical observations are carried out at 66 stations of visual observations and 24 photographic stations; in this work of observations more than 3000 volunteers participated. The method of visual observation involved the use of a battery at AT-telescopes or theodolites situated along the meridian and a vertical circle perpendicular to the visible orbit of the satellite. The time between the moment of passage of the satellite and the time signals provided by radio or telephone are recorded on a tape recorder or a printing chronograph. Photographic observations are made with a wide angle aerial camera NAF-3s/25 with objectives having a focal distance 25 cm, a diameter objective of 10 cm, and a field of vision of 32°×52°. Detailed accounts are presented of the method of visual observations including the recording and transmission of observations, the equipment of the visual observing station, the organizational network of such stations and an analysis of the results of the observations. The procedure of photographic observations is described in detail and a diagram of an installation for recording time of observation used at the Institute of Astrophysics at the Kazakh Academy of Sciences is presented. The use of light flares in connection with photographic observations is discussed. Maps showing the distribution of foreign stations reporting to the U.S.S.R., the results of sputnik observations and the distribution of Soviet visual satellite observation stations are presented. Appendices contain a list of visual artificial satellite stations in the U.S.S.R. together with their code numbers, procedures for transmitting telegrams on the coordinates of artificial satellites at Soviet observation stations, procedure for collecting data on sputnik observations from Soviet observation stations, tables giving the observations on artificial earth satellites of Soviet stations for the period October 1957–February 1958, summary of deviations of individual observations from the computed orbit for March 7, 1958, results of observation of the second artificial earth satellite by several visual stations with deviations from the computed orbit, results of observations of Soviet artificial earth satellites by foreign stations (October–December 1957), results of observations of the second Soviet artificial earth satellite by foreign stations (January–February 1958) and a list of Soviet photographic artificial earth satellite observation stations. *Subject Headings:* **1. Visual satellite observations 2. Satellite photography 3. Satellite data 4. U.S.S.R.** —*I.L.D.*

12.7–69 **551.508.25:551.521.18:551.507.362.2**

Gelinas, R., **The design, construction and use of a ground based infrared radiometer for observation of satellites.** Block Associates, Inc., Cambridge, Mass., Contract AF 19(604)-2420, Final Report No. 1, Pt. 3, July 31, **1960.** 39 p. 8 refs., 84 eqs.—This report proposes a design of an IR Satellite Spotter based on the experience gained in a joint effort of Block Associates, Inc. and Naval Supersonic Laboratory MIT. This report investigates the problem of the optimization of signal to noise by means of optical parameters, detector configuration, and signal chopping for cases of current noise, and lattice noise limited photoconductors. In addition the problem of detector choice for expected signal wavelength is explored. A feasibility system is described having a 60″ diameter parabolic reflector with an InSb detector, 18 mm. square, cooled to −196°C and slaved to Millstone. The final system is expected to consist of a 60″ diameter Schmidt corrected spherical reflector with an InSb strip detector, scanned by a continuously moving belt along the strip and cooled to −196°C. *Subject Headings:* **1. Satellite observation facilities 2. Infrared radiometers.**—*Author's abstract.*

12.7–70 551.507.362:523.4:574.6

Phillips, Charles R. and Hoffman, Robert K. (*both, Physical Def. Div., U. S. A. Chemical Corps Bio. Lab., Fort Detrick, Md.*), **Sterilization of interplanetary vehicles.** *Science*, Wash., D. C., 132(3433):991–995, Oct. 14, 1960. Fig., table, 16 refs.—Careful planning will be required to prevent earthly organisms from contaminating the moon and planets until we have conducted careful biological studies on such extraterrestrial bodies. Contamination must be avoided in order to solve a series of fundamental questions such as that of the origin of life itself. It is by no means certain that life forms cannot travel through space. Sterilization techniques appear to be feasible and a hypothetical case is set forth. The practical aspects of sterilization of our probes and vehicles are considered. While it might be possible for earthly life to infect neighboring planets and interfere with its evolution the reverse is also true. It is noted that in the not too distant future, interplanetary quarantine regulations will become imperative. *Subject Headings:* **1. Interplanetary vehicles 2. Interplanetary travel 3. Interplanetary biology.**—*E.Z.S.*

12.7–71 551.507.362.2:551.591

Przybylski, A. (*Mount Stromlo Obs., Australian Natl. Univ., Canberra, A. C. T.*), **On the visibility of artificial satellites with highly inclined orbits.** *Australian Journal of Science, Sydney*, 20(7):193–202, March/April 1958. 3 figs., 3 tables, 3 refs., 35 eqs. DLC—A discussion of factors determining the visibility of artificial satellites is followed by a description of methods used for the prediction of their periods of visibility. The formulas used in this paper are illustrated by several numerical examples. *Subject Heading:* **1. Satellite observatory visibility.**—*Author's abstract.*

12.7–72 551.507.362.2:551.508.25:551.521.18

Willey, Ronald R., Jr., **The design and construction of an infrared spectroradiometer for observation of the earth from a high altitude vehicle.** Block Associates, Inc., Cambridge, Mass., Contract No. AF 19(604)-2420, Final Report No. 1, Pt. 4, July 31, 1960. 9 p. 7 figs.—A prototype satellite interferometer spectroradiometer has been built in order to study the infrared energy from the earth. The theory of the device, a rapid scanning interference spectrometer, and the construction of a suitable cam-driven scanning mechanism is discussed. More work is required to produce a scanning drive which will withstand the environmental conditions involved in satellite applications. *Subject Headings:* **1. Infrared spectro-radiometers 2. Satellite interferometer spectroradiometer.**—*Author's abstract.*

12.7–73 551.507.362.2:621.396

Wächtler, Maximilian, **Funkpeilungen des ersten künstlichen Erdsatelliten Sputnik.** [Radio bearing taken from the first artificial satellite of the earth, Sputnik.] *Deutsche Hydrographische Zeitschrift*, Hamburg, 10(5):169–175. 6 figs., table, 2 refs. German, English and French summaries p. 169. DWB—Information is given about the radio bearings taken from the first satellite Sputnik on 16th and 17th Oct. 1957 on a frequency of 20,005 Mc. A special feature is that the results obtained by application of the twinchannel visual direction finder are pure line indications. The different series of observations show a variation of the bearings in a clockwise direction as well as in anti-clockwise direction, covering angles between circ. 4° and 171°. These bearings for a shortwave transmitter beyond the ionosphere were compared with bearings for two very distant stations on nearly identical frequencies which both show the elliptical split being characteristic of coherent waves. *Subject Headings:*

1. U.S.S.R. satellite, 1957 Alpha (Sputnik I) 2. Radio direction finding from satellite observatories.—*Author's abstract.*

12.7–74 **551.507.362**

Petri, Winfried (*München*), **Raumsonden 1959.** [Space probes 1959.] *Naturwissenschaftliche Rundschau*, Stuttgart, 13(2):46–50, Feb. **1960.** 9 figs. **DWB, DLC**—The scientific achievements of the various artificial satellites are surveyed and evaluated. Considered most promising is Explorer VI (1959δ) with its radio equipment and meteorological instruments capable of responding to 30 different elements from the earth. The hitting of the moon by Lunik 3, Oct. 4, 1959 is evaluated as a new landmark in the competition between U. S. and U.S.S.R. The orbit of Lunik 3 is appraised as the result of cooperation between rocket technique, radio direction and astronomical computation methods. The photographing of the backside of the moon is considered the greatest achievement of moon exploration since the invention of the telescope. Our knowledge on the planetary magnetic field and the influence of the sun in a threefold aspect had been advanced by Vanguard I. A clearer picture of the structure and meteorology of the high atmosphere are the chief achievements of space probes of 1959. Voluminous material about the radiation belts of the earth had been supplied by the space probes. The most important geophysical discovery, a considerable deviation of the geomagnetic field from the theoretically calculated value with increasing height, is a result of Lunik I. A stream of loaded particles circulating the earth westward with its main density at a distance of three earth radii is responsible for the deviation, according to DOLGINOV and PUSHKOV. *Subject Headings:* **1. Space research and development.**—*O.T.* ⓢ

12.7–75 **551.507.362.2:523.51**

†Dubin, Maurice, **Interplanetary matter and the earth satellite.** *International Astronautical Congress, Rome, Sept. 17–22, 1956, Proceedings of the 7th Congress*, issued Rome, **1956.** p. 645–670. 9 figs., 3 tables, 45 refs. **DLC** (TL787.I44)—An experiment for the measurement of meteoric particles entering the earth's atmosphere has been undertaken for the IGY earth satellite. Such measurements would be of scientific importance in determining the role of interplanetary particles as related to the geophysics of the atmosphere, the structure of the ionosphere, sporadic E, noctilucent clouds, airglow, etc. Meteoric particles colliding with the satellite may also constitute a hazard affecting the reliability of the equipment in the satellite. A brief review of present day knowledge of meteor physics is made to point out the advantages of measurements from an earth satellite. The method for detecting the influx of meteoric particles into the earth's atmosphere is based upon the acoustical energy generated from the impacts. This method is reviewed and results from V-2 and Aerobee rocket experiments using this technique are described. Extreme engineering restrictions on weight, space and power require the use of transistorized electronic equipment. The acoustical method for the detection of meteoric particles seems promising as a means of extending our knowledge of the mass and density of interplanetary matter. *Subject Headings:* **1. Interplanetary matter 2. Meteoric particle measurement techniques 3. Aerobee rocket experiments.**—*Author's abstract.*

12.7–76 **551.507.362.2:574.6**

Chernov. V. M. and Iakovlev, V. I., **Nauchnye issledovaniia pri polete zhivotnogo na iskusstvennom sputnike Zemli.** [Scientific observations during the flight of an animal in an artificial earth satellite.] *Iskusstvennye Sputniki Zemli*, Moscow, No. 1:80–94, **1958.** 11 figs. **DLC.** Transl. into English issued in Artificial Earth Satellites, Vol. 1, issued N. Y., Plenum Press; London, Chapman & Hall, **1960.** p. 102–120. 11 figs. (incl. photos). **DWB** (629.1388 A791ar)—With the aid of photographs and diagrams, the authors describe the construction of the cabin for housing the experimental animal and the equipment and scientific apparatus for providing the animal with water and food, for holding the animal in place in the cabin, for recording respiration, motor activity of the animal, cardiac biopotential and maximum arterial pressure. The training of the experimental animal is described in detail. The animal's responses during the flight are grouped according to the stage of the rocket in flight, namely, the pre-start period, release of the rocket and motion in orbit. The preliminary results indicate that during the pre-start period the cardiovascular and respiratory responses of Laika did not differ from the normal; during the release of the rocket, when the acceleration was several times that of gravity, and its action was in the direction chest-spine, the dog appeared pressed against the surface of the cabin but did not manifest any motor unrest; during maximum acceleration the respiratory frequency exceeded 3–4 times that of the initial role. The rate of cardiac contraction was maintained at a higher level than the initial level after some decrease. During the orbit period the condition of weightlessness supervened. With the onset of weightlessness the body of the animal ceased to be on the floor of the cabin and because of contraction of the muscles the extremities were slightly withdrawn from it. Since the chest did not experience pressure the respiratory rate decreased. After a very brief and small acceleration of the heart beat (immediately after cessation of acceleration and vibration) the rate of cardiac contractions continued to diminish and approach the initial magnitude. The time during which the number of heart beats after cessation of acceleration approached the original level was about three times greater than under laboratory conditions. As a result of a change in the afferent central nervous system and the functional condition of the subcortical structures regulating blood circulation and respiration, the time of normalization of these functions after acceleration was prolonged. Analysis of the electrocardiogram showed an alteration in its elements and prolongation of individual intervals. Finally, an analysis of the hygenic state of the cabin showed that oxygen was produced in an adequate amount during the flight. The pressure in the cabin was not reduced. *Subject Headings:* **1. Animal physiology in satellite flight 2. Physiological responses in satellite flights.**—*I.L.D.*

12.7–77 551.507.362.2:621.396

Hilton, W. F. (*Hawker Siddeley Aviation, Great Britain*), **A proposal for a British communications satellite.** *The New Scientist*, London, 8(203):907–909, Oct. 6, **1960.** 5 figs. **DLC**—Use of artificial satellites to receive a radio signal from one part of the earth and relay it to another could be extremely economical. With 90% launching success and a 22 year life of a satellite the cost of transatlantic telephone calls could be cut to one fortieth of the present cost. Wave lengths of 300 Mc/s up to 11,000 Mc/s could be used. A discussion is given of the coverage that could be given by various types of orbit. It is suggested that a system of six satellites could give complete coverage over the whole earth. A description is given of a suitable satellite which would carry two radio transmitter-receivers each of 45 watts radiofrequency power. Solar cells would be used to give a 500 watts d.c. electrical power. A method of stabilizing the satellite so that the radio power could be directed as required is suggested. There appears to be a good technical case for Britain to enter upon a program of design and construction of a communications satellite. *Subject Headings:* **1. Communication satellites 2. Satellite radio communication.**—*R.B.*

12.7–78 551.507.362.1:551.501.75:551.557

First meteorological rocket-firing network initiated. *American Meteorological Society, Bulletin*, 41(7):388–402, July **1960. DWB**—Report of the announcement of the beginning of regular meteorological rocket firing periods. From Jan. 18 to Feb. 19, 1960, low cost Loki and Arcas rockets carrying instruments to gather meteorological data in the upper atmosphere were simultaneously fired on a daily basis from Wallops Island, Va., and Point Mugu, Calif. Periodic firing from widely separated stations are planned. The rockets reach altitudes of over 40 mi and primarily gather data on winds, but it is expected that improvements will lead to routine observations of temperature and pressure. The Loki and Arcas rockets are described. *Subject Headings:* **1. Upper air wind measurement techniques 2. Rocket networks 3. Loki rockets 4. Arcas rockets.**—*E.Z.S.*

B3. AGRICULTURE

See also: **Use of direct-beam radiation** (Brooks), 12.7–112; **Phenology of Austria** (Reiss), 12.7–259; **Conditions for frost forecasting, Ukraine** (Bialynitskaia), 12.7–305; **Front control by means of screens** (Primault), 12.7–367; **Control of temp. and day length in glasshouses** (Brown), 12.7–433; **Temps. under plastic roof and in slat house** (Moore), 12.7–435; **Climat. of glasshouses** (Whittle, Lawrence), 12.7–436.

12.7–79 551.586:63(43-11) 551.582.3:551.506.8:551.577.2(43-11)

*†Mäde, Alfred, **Methodische Voruntersuchungen für eine Agrarklimatologie der DDR.** [Methodical preliminary investigations for an agroclimatology for the German Democratic

Republic.] *Deutsche Demokratische Republik. Meteorologischer und Hydrologischer Dienst, Abhandlungen*, 6(46), **1958.** 38 p. 11 figs., 16 maps (fold.), 6 tables, 23 refs. German summary, p. 37–38. **DLC.** Review by F. Steinhauser in *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 10(1):163–164, **1959.** Review by O. M. Essenwanger in *American Meteorological Society Bulletin*, 41(5):282–283, May **1960.**—Purpose of the investigation was to determine ways and means by which the available comprehensive meteorological data and the less comprehensive phenological data may be utilized in the contemplated agroclimatological service of the German Democratic Republic. A series of maps were developed based upon the vegetation period of several crops rather than chronological periods of precipitation. The isohyets for the phenological period 1947–1951 are based upon detailed analyses of long period precipitation records. Number of hours of humidity $<70\%$ are also mapped for the same phenological period. The discussion includes an approximation method (interpolation) for computation of mean precipitation. *Subject Headings:* **1. Agrometeorological services. 2. Phenological charts 3. Precipitation charts 4. Eastern Germany.**—*W.N.*

12.7–80 551.5:63:629.13

Roldán Seminario, Ernesto, **La asistencia meteorológica para la aviación agrícola.** [Meteorological aid in agricultural aviation.] *Revista Meteorológica del Perú*, Lima, 5(9):24–26, June **1960.** 9 refs. **DWB**—The establishment of an agrometeorological service has been agreed upon by the Meteorological Service of Peru. The article brings out the importance of agricultural aviation and the use it can make of the proposed service. The pilots of low-flying planes for fumigation and killing-frost prevention must know take-off and landing conditions, turbulent zones, visibility, etc., as well as favorable times for the flights. For this a microclimatic study of air layers from the ground to 50 m will be undertaken covering temperature, humidity, evaporation evapotranspiration, dew forecasting, etc. *Subject Headings:* **1. Agricultural aviation 2. Agrometeorological services 3. Peru.**—*A.L.M.*

12.7–81 **551.509.59:63** **551.586:631.1(58)**

Calzada Benza, José, **La agrometeorología y la producción agrícola.** [Agrometeorology and agricultural production.] *Revista Meteorológica del Perú*, Lima, 5(9):23–24, June **1960. DWB**—The author emphasizes the importance of establishing an agrometeorological service in Peru to forecast adverse conditions to farmers for crop protection. He shows the direct relationship of weather to crop production; even minute changes in the weather will affect it. For instance, the harvest of potatoes in the central coastal area will increase during a season by a temperature and humidity decrease of one degree and one per cent, respectively. The effect on production in cotton and the yield of a variety of the sweet potato are also given as examples. *Subject Headings:* **1. Agrometeorological forecasting services 2. Peru.**—*A.L.M.*

12.7–82 551.586:551.**584.43**:633.11

*†Penman, H. L. and Long, I. F. (*both Rothamsted Exp. Station, Harpenden*), **Weather in wheat: an essay in micro-meteorology.** *Royal Meteorological Society, Quarterly Journal*, 86(367):16–50, Jan. **1960.** 13 figs., 9 tables, 31 refs., 7 eqs. **DWB, DLC**—Data for three summers (1955–1957), obtained from continuous records of temperature, humidity and wind in and above the wheat crop at levels up to about 2 m are presented and tabulated. The discussion is arranged in 12 sections. The first two sections give, in order, a brief account of the instruments and a description of the site. The following three sections summarize, tabulate and graphically represent the results for 1955, 1956 and 1957. Sec. 6 introduces an analytical Part II, using the data from a period of 8 days (June 12–19, 1957) of fine weather after rain, discusses the generalized profile equation. The next three sections consist of detailed analysis of the 8 days of data. Sec. 10 and 11 consider, in order, daily cycle of temperature and humidity, and the source of water vapor. The final section discusses some biological and physical implications of the results. *Subject Heading:* **1. Wheat field micrometeorology.**—*I.S.*

12.7–83 **551.515.83**(98):**551.586**:633(491.1)

Malmström, Vincent H. (*Middlebury College*), **Influence of the Arctic front on the climate and crops of Iceland.** *Association of American Geographers, Annals*, 50(2):117–122, June **1960.** 11 figs., 2 foot-refs. **DWB, DLC**—Trends in potato production in Iceland since 1935 were examined and it was found that trends in the 9 years period 1949–57 ranged from maximum to inimum production. Studies of the summer indices of moisture and warmth during this eriod on both sides of the weather-divide suggest that summer displacements of the Arctic ont take place and these displacements account for the variations in potato production rates. hree possible summer positions of the Arctic front are, therefore, postulated. Similar dis-lacements are noted over Norway. Potato production in Iceland from 1935–57, the summer dices of warmth and moisture on both sides of the weather-divide are shown graphically. ketches illustrate the "normal" position of the Arctic front and its northward and southward isplacements. *Subject Headings:* **1. Arctic fronts 2. Frontal effects on potato yield 3. Potato eld 4. Iceland.**—*E.Z.S.*

12.7–84 551.586:551.524.31:633.18

Shiraki, M.; Ohashi, T. and Niwa, I. (*all, Gifu Agricultural Exp. Station*), **Effect of different eteorological conditions on the late development stage of rice plant, Pt. 2.** *Journal of gricultural Meteorology,* Tokyo, 15(3):118–122, Jan. **1960.** figs., 5 tables. In Japanese; nglish summary p. 122. **DWB**—In order to investigate the effect of meteorological conditions n the late developmental stage of rice plants, the exchanging method of plants in pots between vo stations was adopted, where the diurnal temperature change is respectively large and small. he experiment showed that the rice plant placed where there is a large diurnal temperature nange shows good growth and a strong resistance to Brown spot. *Subject Headings:* **1. Rice eld microclimatology 2. Temperature effects on rice plants.**—*Authors' abstract.*

12.7–85 551.586:631:633(420)

Smith, L. P. (*Met. Off., Great Britain*), **The relation between weather and meadow-hay elds in England, 1939–56.** *British Grassland Society, London, Journal,* 15(3):203–208, **1960.** figs., table, ref. **DA**—A close relationship has been established between yields of meadow ay and a meteorological parameter, namely, estimated "actual" transpiration during the eriod of growth. County data for yield and transpiration were combined, using grass acreages s weighting factors, into regional and national values. After an adjustment had been made r a steady improvement in yield after 1946, the correlation between the actual and calculated eld in England for the years 1939–56 was 0.95. The mean error between the actual yields nd the calculated yields was 2.1%, the formula being: Yield (cwt/acre) $=1.56T+7.05+0.27N$, here $T=$estimated actual transpiration (in.), $N=$number of years after 1946. *Subject eadings:* **1. Weather and hay yield 2. Hay yield 3. England.**—*Author's abstract.*

12.7–86 551.586:634.83(434.3)

*†May, Hans Erich, **Einflüsse von Klima und Witterung auf Güte und Ertrag im Weinbau: eiträge zur vergleichenden Klimatologie der Weinbaugebiete Pfalz und Nahe.** [Influences climate and weather on quality and yield in viticulture: contributions to the comparative imatology of the Palatinate and Nahe river wine-growing regions.] **1957.** 174 p. 47 bles, 12 figs., 224 refs. Thesis (Ph.D.)-Johannes Gutenberg Univ., Mainz. Vita appended end.—This comprehensive study of the interrelationship between weather and climate and ticulture comprises the following: a survey of the literature dealing with the influence of eather and climate on vine cultivation; statistical data on the vine types and cultivated area the Palatinate; the natural bases for vine cultivation in the region under study, including the ological characteristics of the region and geomorphological and soil properties; atmospheric mperature, relative humidity, cloud cover, precipitation, aridity index, wind climate and enology of the vine; weather influences upon quality and yield of grape; methods of analysis, cluding a general comparison of climatic data with yield and quality, the Lossnitzer clima-am, the Holderfleiss order of rank method, etc., partial and multiple correlation of the in-vidual weather influences (sunshine duration, temperature and precipitation) with weight wine and with acidity; and influence of individual weather elements upon yield of vine. xtensive data are presented in tables both in the text and in an appendix. *Subject Headings:* **Weather effects on viticulture 2. Viticulture 3. The Palatinate, Germany.**—*I.L.D.*

12.7–87 551.524.36:551.584.4:634.8(282.243)

*Fuss, Franz, **Nächtliche Temperaturverhältnisse zweier Weinberge im Elbtal.** [Nocturnal nperature condition in vineyards in the Elbe Valley.] *Angewandte Meteorologie,* Berlin, 3(8):225–230, Sept. **1959.** fig., 5 tables, 2 refs. German summary p. 225. **DLC**—Durin the period Oct. 1, 1955–Sept. 30, 1956 a series of observations of minima of air temperature a 50 cm above the ground were made by means of alcohol minimum thermometers withou radiation shielding in order to determine nocturnal temperature distribution along the slope of two vineyards in Dresden-Pillnitz. In order to be independent of the annual variation o absolute temperature all measurements were expressed at $\Delta t=t'_x{}'-t'_{14}{}'$ for $t'_x{}'$=minimum a the measuring point x, $t'_{14}{}'$=minimum at the measuring point 14, x=measurement point 1 t 13 and 15. A double distribution analysis yielded the degree of significance of the difference of the temperature minima of all measurement points. The annual means of the Δt-value increased on both slopes with increasing height with reference to point 14. The increasin magnitude of the temperature difference Δt did not correspond to the absolute elevation of th measurement points above sea level but rather to their distance from the upper forest boundar of the slope. All measurement points whose height differences were at least 10 m showe significant temperature differences. The monthly means of temperature indicate that the ai 50 cm above the ground was colder the greater was the distance from the upper forest boundar of the slope. On cloudless nights with winds less than 2 Beaufort the temperature decreas with increasing distance from the upper boundary of the slope was more marked than in th average of all observation nights. The height difference of 50 m was just as effective a radiation shelter by the instrument booth together with the 1.5 m distance above the ground The use of temperature minima in the instrument shelter to estimate the frequency of frost a the different measuring points is discussed. *Subject Headings:* **1. Vineyard micrometeorolog 2. Nocturnal temperatures 3. Vineyard temperatures 4. Elbe Valley, Central Europe** —*I.L.D.*

12.7–88 551.586:631.362:664.8

Hedlin, C. P. (*Dept. of Eng. Sci., Ontario Agri. Col., Guelph, Canada*), **Applying weathe data to crop drying.** *Air Conditioning Heating and Ventilating*, N. Y., 57(2):93–94, Feb. **196** 3 figs., 5 refs. **DLC, DWB**—The rate by which moisture is removed from a medium is inversel proportional to the increase in the specific humidity of the air or the dry-capacity of th medium. Using this hypothesis, a useful formula has been drawn which enables useful desig criteria to be developed for drying farm crops. It also provides the means of studying th initial conditions of air as a weather variable and the rate at which moisture is absorbed int media. Upon it is based means whereby meteorological records can be used to predict th future performance of agricultural crops with some degree of certainty. Details on the desig are included. *Subject Heading:* **1. Crop drying.**—*N.N.*

12.7–89 551.586:551.579.5:633.

Tomanek, G. W. (*Div. of Biological Sciences, Fort Hays Kansas State College, Hays*) **Effects of climate and grazing on mixed prairie.** *American Association for the Advancement o Science, Wash., D. C., Publication*, No. 53:371–377, **1959.** 4 tables, 7 refs. **DWB** (M86:5 A512gr)—Mixed prairie, a mixture of short and wild grasses, is well controlled by climate an grazing in the central Great Plains. In some places six or seven grasses make up the prairie Each of these grasses is briefly discussed. Moisture is considered one of the most critica environmental factors in the Great Plains. Basal cover and forage production of the nativ vegetation are much affected by soil moisture fluctuations. Forage yields are quite sensitiv to soil moisture and annual precipitation which emphasize the necessity of a flexible livestoc program. Fluctuating climate causes composition changes on short grass uplands. Th effect of grazing on the vegetation of grasslands is often measured by changes in compositio cover and yield. Moderate grazing is more beneficial to either nongrazing or heavy use. It i concluded that drought and overgrazing combined have very bad effects which can be avoide by good range management. *Subject Headings:* **1. Grassland climatology 2. Grazing effect 3. Soil moisture variations 4. Great Plains.**—*I.S.*

12.7–90 551.586:632.1(8

Bazán de Segura, Consuelo, **La agrometeorología y las enfermedades de las planta** [Agrometeorology and plant diseases.] *Revista Meteorológica del Perú*, Lima, 5(9):21–2 June **1960.** **DWB**—The relationship between weather conditions and plant diseases in Per rovides a method for the detection and proper treatment of plant diseases. Discussed are ix diseases of different plants for example: *Kanthomonas malva cearum* which attacks cotton lants in Piura and *Verticillium albotrum* which attacks cotton along the central coast. *Subject Ieadings:* **1. Plant diseases 2. Cotton diseases 3. Peru.**—*A.L.M.*

12.7–91 551.586:632.1(85)

Beingolea, Oscar, **La agrometeorología y las plagas en la agricultura.** [Agrometeorology nd agricultural plagues.] *Revista Meteorológica del Perú*, Lima, 5(9):19–20, June **1960.** **DWB**—The intensity and activity of pests which attack crops, particularly the cotton plant, nd also rice, fruit trees, laurel and olive trees in Peru are shown to be directly related to weather onditions. Conditions under which pests thrive or are checked are given for thirteen species, ncluding the locust. The author suggests forming an extension to the Ministry of Agriculture pecifically concerned with weather and long range forecasting designed to aid agricultural ntomology. *Subject Headings:* **1. Plant pests 2. Peru.**—*A.L.M.*

12.7–92 551.511.32:633

Decker, Wayne L. (*Dept. of Soils, Univ. of Missouri*), **Variations in the net exchange of adiation from vegetation of different heights.** *Journal of Geophysical Research*, Wash., D. C., 4(10):1617–1619, Oct. **1959.** 2 figs., table, 5 refs., eq. **DLC**—The measurements of net adiation from one ventilated and two unventilated radiometers were compared, and instrunental corrections were made. Using these radiometers, net radiation was measured from a hort grass turf, an alfalfa field, and a corn plot The magnitude of the net radiation term from he three covers decreased with decreasing height of the vegetative cover. The possible effect vhich these radiation differences might have on evapotranspiration is discussed. *Subject Ieadings:* **1. Net radiation exchange 2. Radiation from vegetation.**—*Author's abstract.*

12.7–93 551.586:551.573:581.11

Kramer, P. J. and Russell, M. B., **Plant-water relations.** *Advances in Agronomy*, N. Y., 1:51–77, **1959.** figs., tables, refs. at end of ch. **DWB** (630.72 A244ad)—This section liscusses the physiological significance of water deficits. The organization of the section onsists of a discussion of how internal water deficits affect plant growth, a consideration of vhy internal water deficits develop, and a description of the methods of measuring internal vater deficits. Graphs show the effects of moisture deficit on daily closure of stomata of pear, nd on transpiration, relative turgidity and growth of tomato and cotton. *Subject Headings:* **. Plant-water relationships 2. Evapotranspiration.**—*I.S.*

12.7–94 551.506.8:551.583.13(47)

Dolgoshov, V. I., **Kogda machinaetsia vesna** [When does spring begin?] *Priroda*, Moscow, No. 3:125–126, March **1960.** **DLC**—The astronomical, hydrological, climatological nd phenological criteria for the start of spring are reviewed critically. The calendar division f the year into four seasons of three months each makes the beginning of spring March 1 and ts end May 31 every year, but this contradicts actual climatic and weather conditions in the J.S.S.R. The climatological designation of the beginning of spring on the passage of mean laily air temperature through 0° or 5°C takes into consideration the natural conditions of lifferent regions. But the fact that summer begins when the mean air temperature passes hrough 10° or 15°C would mean that in the extreme north of the U.S.S.R. spring would slide nto fall since summer by this definition does not exist. On the basis of various phenological bservations for the start of spring in the Moscow district, the dates of its beginning extend rom the beginning of February to the middle of April. Neither the radiational weather and henological criteria for the start of spring in the Moscow area reflect the reality of natural rocesses. But according to the combination of seasonal phenomena it is most correct to onsider that spring begins in this area in the third decade of March. *Subject Headings:* **. Seasonal trends 2. Seasonal variations 3. U.S.S.R.**—*I.L.D.*

12.7–95 551.586:63:06.045

Hrbek, Josef, **II. zasedání agrometeorologické komise při SMO ve Varšavě.** [Second ieeting of the WMO Commission for Agricultural Meteorology at Warsaw.] *Meteorologické*

Zprávy, Prague, 12(1):5–7, 1959. 3 photos. **DWB, DLC**—A review of the work of the 2nd session of the Commission for Agricultural Meteorology of WMO, which was held between Sept. 29–Oct. 17, 1958 in Warsaw. *Subject Heading:* **1. WMO. Agricultural Meteorology Commission meetings.**—*J.N.*

B4. FORESTRY

12.7–96 **551.588.6:551.578.48**(436)

Richter, H., **Wald und Lawinen.** [Forest and avalanches.] *Arbeitskreis "Wald und Wasser," Mitteilungen*, Coblenz, No. 3:70–75, 1959. 10 photos. **DWB** (M:634.9 A664mi)—The importance of torrent and avalanche control in the water regulation of high mountain regions is discussed and the special role of the forest in the control of avalanches is considered with particular reference to special studies carried out in Austria. Avalanches are a disturbance in the water regime or of the precipitation regime in case they result from advected snow. Displacements of precipitation amounts of an entire winter period constitute an abnormality rarely encountered in torrential stream prevention. The total precipitation of a season can be transported to a strange catchment basin where it can produce a catastrophe. Avalanches do not break out from closed forest. Above the natural forest boundary, only technical artificial structures are an effective defense against avalanches; while below this line, where the forest does not always exist, technical support structures have only a temporary character and must remain in operation until the forest has acquired the age and resistance capacity enabling it to act as defense against avalanches. This age is between 30 and 50 yrs. The use of afforestation as defense against avalanches in Austria is described. The employment of special devices to prevent creeping pressure, and snow transport by wind and the furthering of snow drainage of slopes are described with the aid of photographs. *Subject Headings:* **1. Avalanche control 2. Afforestation 3. Austria.**—*I.L.D.*

12.7–97 **551.584.9:628.49**

Sakanoue, T. (*Fac. of Agric., Kyushu Univ.*), **Microclimatic investigation of waste heap.** *Journal of Agricultural Meteorology*, Tokyo, 15(2):59–63, Oct. **1959.** 9 figs., photo, table. In Japanese; English summary p. 63. **DWB**—The author investigated the microclimate of a waste heap. That is, the hill slopes permitted the descent of cold air and the ascent of warm air. The layer of air near the ground had peculiar meteorological properties which determined the climatic habitat of the plants growing thereon. There were 10 observation points located on the slopes in different directions and angles degree. All of the maximum and minimum temp. readings were taken at a height of 30 cm in winter. Vertical distribution of temp. and humidity readings were taken at 0∼150 cm height in spring and summer. A figure shows the average distribution of maximum and minimum temp. on the waste heap for winter days. It was found that the lowest temp. and maximum temp. range were on the south slope. Results of humidity measurement on the south slope, indicated a dry air layer, so the plants did not grow well there. *Subject Headings:* **1. Microclimatic investigations 2. Topographic influences 3. Forested slope microclimates.**—*Author's summary.*

12.7–98 **551.586:551.577:551.551:551.554:632.187**(943)

Whittingham, H. E., **Meteorological factors controlling success or failure of scrub burns in plantation areas in southeast Queensland.** [In: Fire Weather Conference, Melbourne, Australia, July 1958, **Proceedings,** issued Melbourne, **1958.** Conference Paper, No. 4 (40 p.) 6 figs., 12 tables, 10 refs., eqs.] **DWB**—The purpose of scrub burning prior to afforestation is explained with a discussion of the main forest areas, the scrub burning season and the size of burns. A criterion of success is derived in terms of man hours per acre spent in clearing the site after burn, verbal assessments being converted into numerical estimates. The existing Forestry method of selecting suitable burning days is outlined and its limitations discussed. Rainfall is shown to be the major parameter affecting the success of scrub burns followed by wind, vertical wind shear and low layer atmospheric stability. *Subject Headings:* **1. Scrub burning 2. Burning index data 3. Afforestation 4. Queensland, Australia.**—*Author's abstract.*

12.7–99 **551.586:591.9:631.417**(234.5:432.1)

Markel, Konrad (*Zool. Inst. der Tech. Hochsch., Dresden*), **Die Einwirkung des Klimas auf die Oribatidenfauna des Rohhumus.** [The influence of climate on the Oribatidae fauna in w humus.] *Die Naturwissenschaften*, 45(10):248–249, **1958.** fig., 5 refs. **DLC**—Studies the Oribatidae fauna in humus of older spruce stands of the Erzgebirge (Saxony) showed at the horn mite fauna on the rainy and cool ridge and middle parts of the mountains differs alitatively and quantitatively from the horn mite fauna in the drier and warmer parts. The oldering horizon of lowland spruce stands has a large number of individuals but the litter has small population. At the upper elevation a number of species, characteristic of the lowlands, entirely absent; here surface forms predominate so that the litter horizon is more densely pulated than the moldering horizon. Local factors within the climatic region such as soil rmation, structure of the stand, etc. can modify the Oribatidae fauna but moisture conditions the humus layer, whose water transporting system may not correspond at all to that of the il, are of decisive importance. *Subject Headings:* **1. Climatic effects on fauna 2. Spruce and humus 3. Erzgebirge, Saxony, Germany.**—*I.L.D.*

12.7–100 551.586:551.521.16:595.1

Harvey, George T. (*Forest Insect Lab. Sault Ste. Marie, Ontario*), **A relationship between otoperiod and cold-storage treatment in the spruce budworm.** *Science*, Wash., D. C., 8(3333):1205–1206, Nov. 14, **1958.** fig., 5 refs **DLC**—Exposure of diapausing second-star larvae of *Choristoneura fumiferana* to continuous light at 21°C, after only 6 weeks' orage at 0°C, induces emergence of larvae that will not emerge in photoperiods of 15 or 18 hrs. ollowing the normal storage period (20 weeks) there is no such effect. Complete dark or -hour photoperiods inhibit emergence after storage periods of all lengths. *Subject Headings:* **Biometeorological experiments 2. Photoperiodism 3. Spruce budworm.**—*Author's abstract.*

12.7–101 634.956:551.582.2(83)

*†Bauer, Peter-Paul von, **Waldbau in Südchile: Standortskundliche Untersuchungen und fahrungen bei der Durchführung einer Aufforstung in La Ensanada, Prov. Llanquihue, ile.** [Silviculture in southern Chile: scientific investigations and findings on stands during forestation in La Ensanada, Llanquihue, Chile.] *Bonner Geographische Abhandlungen*, nn, No. 23, **1958.** 120 p. 3 figs.+18 photos, 12 tables, 37 refs., 3 diagrs. **DWB** M(055)B716)—Observations of natural conditions in an area of some hundreds of hectares lected for afforestation, carried out 1951–1956, and their evaluation are presented. The servations deal with the location, climate, soil, water supply and forests of the plantation. ne chapter on climate presents, after an introduction of the basic climatic factors, a description meteorological observations with their techniques and methods. These observations include: nual temperature (daily means of six years with extremes, the daily curve), the vegetation riod, night frosts, atmospheric and vapor pressure, humidity, precipitation including snow, lar radiation, hail, frost, fog and thunderstorms. A comparison of the climate with that of erto Montt and with the native climate of exotic tree species is also presented. *Subject eadings:* **1. Afforestation 2. Climatic data for La Ensanada 3. La Ensanada, Llanquihue, ile.**—*O.T.*

B5. MEDICINE AND HEALTH

See: **Meeting on applied climat.** (Anapol'skaia, Gandin), 12.7–38; **Microclimate and micro-organisms in classrooms, Tiflis** (Dedabrishvili), 12.7–434; **Items** 12.7–440 to 12.7–443.

B6. RADIOACTIVITY

See also **Balloon obs. of artificial radioactivity** (Mantis, Winchler), 12.7–269.

12.7–102 551.510.721(94)

†Bryant, F. J.; Dwyer, L. J. et al., **Strontium-90 in the Australian environment, 1957–58.** *ture*, London, 184(4689):755–760, Sept. 12, **1959.** 3 figs., 7 tables, 28 refs. **DWB**—In ril 1957 the Australian Atomic Weapons Tests Safety Committee included in its program fallout measurements the determination of strontium^{90} in representative Australian materials. mples of soil, powdered milk, cabbages and human and sheep bone tissue were collected and nt to the United Kingdom for radio chemical analysis. This paper reports and tabulates e results for the early part of the program—May 1957 to September 1958, during which riod 243 samples were processed. Age distribution of the human bone specimens and the

distribution of strontium-90 concentration with age are graphically represented. *Subjec Headings:* 1. **Strontium⁹⁰ distribution 2. Artificial radioactive fallout measurement 3. Radiochemical analysis 4. Strontium⁹⁰ in human bones. I. Martin, J. H. II. Titterton, E. W** —*I.S.*

12.7–103 551.521.9:551.586:61

National Academy of Sciences. Committee on the Biological Effects of Atomic Radiation **Report to the public on the biological effects of atomic radiation, based on the 1960 summar reports of the Academy.** Wash., D. C., National Academy of Sciences—National Researc Council, 1960. 19 p. **DWB**—Abstracts of the committee reports on: Genetic Effects Physical Effects, Meteorological Aspects, Agriculture and Food supplies, Disposal and Dispersa of Radioactive Wastes, Oceanography and Fisheries. The developments since 1956 indicat that radiation in all its forms will play an increasing role in many aspects of life. The potentia radiation hazards will increase. Radiation exposure can adversely affect many future generations. The need for conservative management of all radiation sources is obvious. There ar still many unknowns, and research is urgently needed. *Subject Heading:* **1. Biological effect of atomic radiation.**—*E.Z.S.*

12.7–104 551.501.71:551.510.72

Soldat, J. K. (*G. E. Co., Richland, Washington*), **Monitoring for air-borne radioactiv materials at Hanford atomic products operation.** *Air Pollution Control Association, Proceedings*, Vol. 52, **1959.** Issued **1960?** Paper No. 15 (11 p.) 7 figs., 2 tables, 15 refs. **DW** (M10.42 A298ap). Also issued in: *Air Pollution Control Association, Pittsburgh, Pa., Journa* 10(4):265–270, Aug. **1960.** 7 figs., 2 tables, 15 refs. **DWB, DLC**—The characteristics of ai monitoring at work locations, monitoring of effluent gases from separations plants and atmospheric monitoring were discussed and results obtained from the operation of instruments a Hanford were summarized in tables (1958). The measurements are complicated by th presence of naturally occurring radioactive materials and of radioactive fission products fro nuclear detonations. However, the Hanford method is sufficient to ensure that exposure o human beings and animals to air-borne or deposited radioisotopes are well below applicabl limits. *Subject Headings:* **1. Air-borne radioactivity measurement techniques 2. Hanford Washington.**—*K.C.*

B7. INDUSTRY—ENGINEERING

See also: **Met. factors affecting dam design and construction** (Tucker), 12.7–412.

12.7–105 551.506:69(436.14

Hader, Fritz (*Vienna*), **Indexzahlen der Witterungsbewertung bei Bauarbeiten.** [A index of climatic evaluation for building trade purposes.] *Wetter und Leben*, Vienna, 12(7/8) 143–147, **1960.** 3 tables, 2 refs. German and English summaries p. 143. **DLC**—An index c climatic valuation for building trade purposes is defined using monthly data of precipitatio number of days with precipitation, number of days with frost and number of days with a mea temperature below −5°C. The importance of this index is discussed, giving examples fo Vienna. *Subject Headings:* **1. Monthly climatic data 2. Building construction 3. Vienna Austria.**—*Author's abstract.*

12.7–106 551.521.1:69

Sauberer, F. (*Vienna*), **Über die Bedeutung der Strahlungsbilanzmessung für die Bautechnik.** [Importance of radiation balance measurement in the building industry.] *Wette und Leben*, Vienna, 7(8–11):201–202, **1955.** fig. **DLC**—Out of a number of radiation balanc measurements carried out by the author for many years in order to determine the heat exchang of buildings, graphs are presented showing, for given days, the variation of the intensity c direct solar radiation upon the horizontal ground surface upon white wall oriented SSW an SSE and the simultaneously measured radiation balance, the variation of radiation balance o a wall oriented SSW but with a 40° inclined brick roof and the variations of external and interna brick temperatures, etc. *Subject Headings:* **1. Radiation balance 2. Radiation on variousl oriented slopes 3. Building construction.**—*I.L.D.*

12.7–107 551.582.2:69(431.5)

*Reidat, Rudolf, **Klimadaten für Bauwesen und Technik (Lufttemperatur).** [Climatic ta for the building industry and technology (air temperature).] *Germany. Deutscher tterdienst, Berichte,* 9(64), **1960.** 7 p. 3 figs., 53 tables appended. German and English nmaries p. 3. **DWB, DLC**—The frequency distribution of the daily mean and extreme nperatures is calculated for 10 stations and the frequency of the different values compared ongst another. For the purposes of technique the yearly frequency distribution of mean l extreme temperatures is represented in frequency summation curves. The frequency of d day periods as dependent on certain limit temperatures is demonstrated for 14 stations in raphical representation. The relations between wind direction and air temperature are given 10 stations in the form of temperature wind roses. According to the Hill formula, the quency of the dry cooling power is computed from the temperature and wind speed for 5 tions. *Subject Headings:* **1. Climatic data for building industry 2. Air temperature data Germany.**—*Author's abstract.*

12.7–108 551.58:621.3

Rychtera, Miroslav, **Elektrotechnická klimatologie.** [Electrical engineering climatology.] *teorologické Zprávy,* Prague, 12(4):78–82, **1959.** 2 figs., 3 tables. Czech, Russian, German l English summaries p. 78. **DLC, DWB**—Different influences of climatic factors on electrical gineering equipment are discussed. Classification of climatic zones from this point of view is en. *Subject Headings:* **1. Climatic influences on electrical equipment 2. Electrical gineering climatology.**—*J. Němec.*

12.7–109 551.556.1:621.315(522)

Kikuchi, S. and Nagayama, M., **The meteorological investigations on the salty wind nages for the transmission lines occurred in the northern part of Kyushu District in the riod Dec. 28, 1956 to Jan. 4, 1957.** *Journal of Meteorological Research,* Tokyo, 10(9):785–791, ot. **1958.** 12 figs. In Japanese; English summary p. 785. **DWB, DLC.** Reprinted as *anography and Meteorology,* Nagasaki, Japan, 9(175), **1959.**—In this paper, meteorological nditions which caused salty wind damage to insulators of transmission lines in the period c. 28, 1956 to Jan. 4, 1957 in the northern part of Kyushu District were investigated. fore the occurrence of this damage, it was considered that dry and windy weather extending er 30 days might have caused abundant sea-salt and dust to accumulate on the surface of the ulators. The direct causes of this damage were the dense radiation fog in four cases and nt rainfall in two cases, and some meteorological conditions which may be related to damage der fog and rainfall were obtained. These results may be considerably useful in planning prevent such damage. *Subject Headings:* **1. Salt damage to transmission lines 2. Transssion lines 3. Kyushu District, Japan.**—*Authors' abstract.*

12.7–110 551.556.3:621.311.24(479.25)

Bagdasarian, A. B., **Vetry sevanskogo basseĭna i perspektivy ikh energeticheskogo ol'zovaniia.** [Winds in the Sevan Basin and prospects of their utilization for power.] *ademiia Nauk Armianskoĭ SSR, Erivan, Doklady,* 24(2):91–96, **1957.** 3 figs., table, 2 refs. menian summary p. 96. **DLC** (Q60.A5133)—The water power resources of the Armenian .R. are limited and they should be even more restricted if the water level of Lake Sevan is be conserved. Hence solar and wind power potentialities are important, and studies were de in the Institute of Economics of the Armenian S.S.R. Academy of Sciences in 1952–54 letermine the extent to which these resources could be developed; meteorological data from Hydrometeorological Network for 1936–1952 was used, with supplementary expeditionary a. Wind roses for January and July are included and diurnal and annual variations of d are shown in graphs and tables and the conclusion reached that special wind stations ld be used to raise the level of the mountain lakes in the Sevan Basin, using the lakes as ervoirs of power. *Subject Headings:* **1. Wind power studies 2. Lake reservoirs as wind ver accumulators 3. Wind surveys 4. Sevan Basin, Armenian S.S.R.**—*M.R.*

12.7–111 551.506.3:551.515.2

†American Institute of Architects, N. Y., **Hurricanes. Prepared by the AIA Committee Disaster Control.** Its *AIA Technical Reference Guide (TRG),* 13–1, **1959.** 12 p. photos,

41 refs. "Reprinted from *AIA Journal*, for Oct. 1959." **DWB** (M:72 A512tr)—A technica reference guide on hurricanes noting their frequency, geographic distribution and damagin effects. The following are included: hurricane frequency by months 1886–1958; averag frequency by decades since 1886; histograms of tropical cyclones affecting Gulf and Atlant Coastal Regions 1886–1958; a table with notes on devastating Atlantic hurricanes in the 20t Century; a map of the hurricane belt (Caribbean, Gulf and Atlantic); a U. S. map showin minimum allowable resultant wind pressure. Discussion of extent and types of damage existing building code provisions, customary construction practices, and recommendations basic principles of good construction practice. Includes photographs of hurricane damag Source material used and additional references are cited. *Subject Headings:* **1. Hurricane dat U. S. 2. Hurricane damage 3. Gulf Coast, U. S. 4. Atlantic Coast, U. S.**—*E.Z.S.*

12.7–112 551.521.1:72 551.521.1:6

Brooks, F. A. (*Agric. Experiment Station, Univ. of Calif., Davis*), **Remarks on the use direct-beam radiation in architecture and agriculture.** (In: Conference on the Use of Sola Energy, Univ. of Arizona, 1955, **Transactions**, pub. **1958.** Vol. 2: 139–145. 2 figs., 9 refs **DWB**—Meteorologists have calculated the daily total solar radiation and the normal-inciden radiation and have plotted "guidance" curves for them from which architects and agricultur might benefit. Weather Bureau problems associated with the observations of solar energy ar how to make hourly and daily observations, and how to report the data in the most useful for for the public. *Subject Headings:* **1. Solar radiation calculations 2. Direct solar radiati intensities 3. Solar energy utilization.**—*N.N.*

12.7–113 551.586:656.08(5

Satō, Y., **On the traffic accidents and weather conditions.** *Japan. Meteorologic Agency, Tokyo, Memoirs of Industrial Meteorology*, 22(1): 43–48, **1958.** fig., 4 tables, 10 ref 2 eqs. In Japanese; English summary p. 47–48. **DLC.** Reprinted in *Sendai, Japan. Centr Meteorological Observatory, Journal of Meteorological Research of Tōhoku District*, Vol. 1 Memoir No. 12, March **1959.** 6 p. fig., 4 tables, 10 refs. **DWB**—The author has investigat the occurrence of traffic accidents in the district under the control of the Shinjō Police Statio Yamagata Prefecture, and the results are as follows: 1. Main conditions causing the occurren of traffic accidents are: (1) the increase of traffic volume, (2) weather conditions, (3) ro conditions, (4) mechanical trouble in wheels and (5) carelessness of drivers or pedestrian Unexpectedly, there is an increasing tendency to accidents, especially when the weather a road conditions are better. 2. On a day just before or after bad weather, the traffic volume the road may increase, and accidents are considered to occur more frequently than on oth days. 3. On hot days man's power of attention is weakened and many accidents occur. *Subj Headings:* **1. Weather effects on traffic accidents 2. Tohoku district, Japan.**—*From autho abstract.*

12.7–114 551.509.6:551.578.46:625.76(79

Stackhouse, J. L., **Problems of snow removal in mountain passes for 1955–1956.** *Weste Snow Conference, 1956, Proceedings*, 24:13–15, Oct. **1956. DWB** (M06 W527p)—Three ma items that cause problems in the way of winter maintenance of the highway passes are describ These are: 1) snowslides or avalanches, 2) people and 3) equipment breakdown. The Washin ton State Highway Department is responsible for clearing and maintenance of highways duri the winter months. The average statewide cost of snow and ice control per mile in 1954– for all highways was $246.00. *Subject Headings:* **1. Snow and ice removal from roa 2. Washington** (State).—*I.S.*

B8. RADIO PROPAGATION

12.7–115 550.385:551.510.535:551.594

Davies, K. (*Natl. Bureau of Stands., Boulder, Colo.*), **The effect of the earth's magne field on m.u.f. calculations.** *Journal of Atmospheric and Terrestrial Physics*, London, 16(1/ 187–189, Oct. 1959. fig., table, 4 refs. **DWB, DLC**—An investigation, using the transmissi slider technique, shows that the equivalent heights for any given electron density profile reater with the earth's magnetic field included. Diagram and table show that the use of the ppropriate $h'f$ curve increases the calculated MUF by about 7.5%. Errors in MUF calculaions seem to arise more by neglecting the effect of the magnetic field on the vertically incident ay than on the oblique one. Two methods for improving MUF calculations are suggested. *ubject Headings:* **1. Magnetic effects on ionosphere 2. Ionospheric electron density calculaions.**—*O.T.*

12.7–116 551.510.535:551.594.12

Dieminger, Walter E.; Möller, H. G. and Rose, G. (*all, Max-Planck-Inst., Lindan über Vortheim, Germany*), **Further results of sweep-frequency oblique-incidence pulse transmissions.** *ournal of Atmospheric and Terrestrial Physics*, London, 14(1/2):179–180, April 1959. 2 figs. **LC** –Investigation of experiments over a path of 2000 km in Northern Europe (Sodankylä-indau) at Max-Planck-Institute für Aeronomie shows that strong variations of the F2 MUF re caused by virtual height rather than by changes of the critical frequency. *Subject Headings:* **. F2 layer variations 2. Ionospheric soundings.**—*O.T.*

12.7–117 551.594.6:621.396.9

Taylor, W. L. (*Natl. Bur. of Standards, Boulder, Colo.*), **VLF attenuation for east-west nd west-east daytime propagation using atmospherics.** *Journal of Geophysical Research*, Vash., D. C. 65(7):1933–1938, July 1960. 5 figs., 12 refs., 6 eqs. **DLC**—Daytime attenuation haracteristics have been computed by comparing the amplitude spectra of atmospheric aveforms recorded at four widely separated stations. The results of these attenuation measrements are presented for band of frequencies from 3 to 30 kc/s and involving distances of 000 to 10,000 km. Nonreciprocity is evident from this study. Attenuation rates over sea ater for east-to-west propagation were about 3 db/1000 km greater for frequencies below kc/s, and about 1 db/1000 km greater for frequencies above 10 kc/s, than for west-to-east ropagation. East-to-west attenuation rates over land were about 1 db/1000 km greater than for ver sea water. *Subject Headings:* **1. Sferics 2. VLF radio wave propagation 3. Sferics ave forms.**—*Author's abstract.*

12.7–118 551.510.535:551.594.12

Jackson, J. E. and Kane, J. A. (*both, Goddard Space Flight Center, Wash., D. C.*), **Perormance of an RF impedance probe in the ionosphere.** *Journal of Geophysical Research*, Vash., D. C., 65(7):2209–2210, July 1960. fig., ref. **DLC**—The authors reported in a revious letter in this journal (11F–61, June 1960, *Met. Abs.*) that an RF impedance technique f measuring ionospheric electron densities yielded results that were a factor of 3 too small. he purpose of this note is to report the improvement obtained in a later rocket flight, NASA 07, fired at midday Sept. 14, 1959, at Fort Churchill. When the RF field distortion of the robe environment was reduced by performing the impedance measurement at lower RF levels, ne results were quite different. With RF amplitudes of 2 volts and 0.2 volt on the probe, the apacity detuning by the ionosphere was determined by measuring the amount of compensating apacitance required to restore the probe circuitry to its free-space condition. This procedure ielded a response curve from which the resistive loading by the ionosphere can also be deterined. The electron density profiles are shown. It is in principle possible to calculate the roper sheath correction to be applied to the electron density profile. *Subject Headings:* **. Ionospheric probes 2. Ionospheric electron density measurement techniques.**—*E.Z.S.*

12.7–119 551.510.535:621.396

Bailey, D. K. (*Page Commun. Eng., Wash., D. C.*), **Effect of multipath distortion on the hoice of operating frequencies for high-frequency communication circuits.** *Institute of adio Engineers, N. Y., Transactions on Antennas and Propagation*, Vol. AP–7(4):397–404, ct. 1959. 5 figs., 12 refs., eq. **DLC**—Harmful multipath distortion on high-frequency csimile services and telegraphic services operating at high speeds occurs when the received gnal is composed of two or more components arriving by different modes over the same greatrcle path with comparable intensities, but having travel times which differ by an amount qual to an appreciable fraction of the duration of a signal element. The dependence of multiath distortion on the relationship of the operating frequency to the MUF is discussed and a new term, the multipath reduction factor (MRF), is introduced which permits calculation in terms of the lowest frequency which can be used to provide a specified measure of protection against multipath distortion. The MRF has a marked path-length dependence and is calculated as a function of path length for representative values of the other parameters involved by making use of an ionospheric model. It is then shown how the MRF can be used in connection with world-wide MUF prediction material to determine the minimum number of frequencies which must be assigned to a high-frequency communication service of continuous availability operating at high speed. Some comparisons with observations are discussed, and finally conclusions are drawn concerning manner of operation and choice of operating frequencies to reduce or to eliminate harmful multipath distortion. *Subject Headings:* **1. Multipath reduction factor 2. HF communication circuits.**—*Author's abstract.*

12.7–120 **551.510.535**:**551.510.62**:**621.396.6**

Cottony, H. V., **Teachings for accurate measurement of antenna gain.** *U. S. National Bureau of Standards, Circular*, 598, Dec. **1958.** 10 p. 6 figs., 7 refs., 6 eqs. **DWB, DLC**—Comparison of published results of experimental antenna measurements, particularly gains, reveals apparent discrepancies of the order of one or more decibels. Experimental work at the National Bureau of Standards on scaled model antennas for long-range VHF communication via ionospheric scatter revealed some sources of difficulties and led to the adoption of special precautions resulting in significantly more consistent and it is believed more accurate results. The procedures are based on the comparison method, but include in addition to the standard antenna, the use of a third antenna here designated as the reference antenna. To obtain more accurate measurements it was found essential to correct for the standing wave pattern in the field set up, presumably, by reflections from the irregularities in the terrain. Special features of instrumentation, including methods for minimizing and measuring matching losses, are described. The accuracy of the techniques has been verified by measuring the gain of an antenna, the value of which could be accurately calculated. *Subject Headings:* **1. VHF radio wave propagation 2. Antennas 3. Ionospheric scattering.**—*Author's abstract.*

12.7–121 **551.510.535**:**551.594.13**:**621.396.8**

Bowles, K. L. (*Central Radio Propagation Lab., Boulder, Colo.*), **Observation of vertical-incidence scatter from the ionosphere at 41 Mc/sec.** *Physical Review Letters*, N. Y., 1(12): (reprint of 2 p.), Dec. 15, **1958.** 2 figs., table, 4 refs. **DLC**—The observations reported in this paper represent an attempt to verify the existence of the incoherent or semi-incoherent scatter by the free electrons of the ionosphere. The parameters of the equipment used are tabulated. Examples of "A' scope" photographs taken on 21 and 22 Oct., 1958 during daylight hours are shown. The rise in noise level is interpreted as the scatter type of echo. The strong echo at about 85 km range is also illustrated. This echo is interpreted as due to ionospheric scattering of the turbulent variety. *Subject Headings:* **1. Vertical-incidence scatter 2. Ionospheric scattering.**—*I.S.*

12.7–122 **551.510.535**

Hepburn, F. (*Physics Dept., Univ. of Nottingham*), **Constant ionosphere height for audio-frequency propagation.** *Nature*, London, 185(4713):599, Feb. 27, **1950.** 2 figs., 6 refs. **DWB**—The two-fold wave propagation of a distant lightning flash to earth were found equivalent in respect to the earth-ionosphere separation and the storm-distance as principal determinants of the parameter. Observations at Nottingham provided by the Meteorological Office Sferics Network resulted in a constant ionosphere height of 83±2 km for smooth type wave forms. A very slight diurnal variation of attenuation in the appropriate frequency band as observed on a group of 150 apparently regular smooth-type waveforms, and as illustrated by diagrams, might have been due to the very close similarity of day and night-time forms of this group of waves. *Subject Heading:* **1. Ionospheric heights.**—*O.T.*

12.7–123 **551.510.535**:**551.510.62**:**621.396.1**

Dieminger, W.; Möller, H. G. and Rose, G., **Long-distance single *F*-hop transmission.** *Journal of Atmospheric and Terrestrial Physics*, London, 13(1/2):191–192, Dec. **1958.** 2 figs., 5 refs. **DLC**—Observation of the high angle ray of single *F*-hop beyond the limiting distance of the ray radiated tangentially with the earth was predicted in 1955 by DIEMINGER and MÖLLER. This is a brief report on observations supporting their theory. *Subject Heading:* **1. Radio wave propagation over long distances.**—*W.N.*

12.7–124 551.510.535:551.510.62:621.396.1

†Gerson, Nathaniel C. (*Arctic Comm., U. S. Natl. Comm. for IGY*), **Very long distance ionospheric propagation.** *Journal of Atmospheric and Terrestrial Physics*, London, 13(1/2): 169–172, Dec. **1958.** 2 figs., table, 26 refs., 3 eqs. **DLC**—One possible ionospheric refraction condition allowing reception of radio wave energy at considerable distances from the transmitter is indicated. A model showing two concentric, nonmagnetic spheres, representing the earth and its ionosphere and special propagation conditions are shown in figures. Effective coefficient of reflectivity after *n* reflections is presented in the table. *Subject Headings:* **1. Ionospheric radio wave propagation 2. Refraction of radio waves 3. Radio wave propagation over long distances.**—*O.T.*

12.7–125 551.510.535:551.507.362.2:621.396.8

Hibberd, F. H. (*Cavendish Laboratories, Cambridge*), **The effect of the ionosphere on the Doppler shift of radio signals from an artificial satellite.** *Journal of Atmospheric and Terrestrial Physics*, London, 12(4):338–340, 1958. fig., 5 eqs. **DLC**—An idealized case of spherically stratified ionosphere and a spherical earth is discussed with Snell's law applied to the earth of a satellite emitted radio wave. *Subject Headings:* **1. Doppler shift of satellite signals 2. Ionospheric radio wave propagation.**—*W.N.*

12.7–126 551.510.535:551.507.362.2:621.396

Chvojková, E., (*Astronomical Inst., Czechoslovak Acad. of Sci., Prague*), **Investigation of the ionosphere using signals from earth satellites.** *Nature*, London, 182(4646):1362–1363, Nov. 15, **1958.** fig., eq. **DWB**—Author discusses some possible effects of the ionosphere on radio signals from artificial satellites. Various theoretical modes of long distance propagation around the Earth are considered. Author believes a satisfactory answer to the question of what mode of propagation is preferred could probably be given by a detailed study of the Doppler curves, of direction finding measurements and the variation of band-width of the received signal when the satellite is deep below the horizon. *Subject Headings:* **1. Doppler shift of satellite signals 2. Ionospheric radio wave propagation.**—*M.L.R.*

B9. MILITARY METEOROLOGY

12.7–127 551.501.724:551.524:623.451.519

†Reis, G. E., **Temperature measurements on high speed missiles.** *Sandia Corporation, Albuquerque, N. M., Reprint* SCR-73, March **1959.** 4 figs., table, 9 refs., 8 eqs. "From National Telemetering Conference, Los Angeles, Aug. 20–21, 1956. Pub. in National Telemetering Conference, 1956." **DWB** (M(055) S217re)—The problem of making temperature measurements on missiles at velocities above Mach 5 imposes some rather severe demands on materials and techniques. An examination of the problem is made to determine the range in which temperature instrumentation is possible. An approach for extending the present range of temperature measurements is discussed. *Subject Headings:* **1. Temperature measurement techniques 2. Missile flight temperature measurements.** —*Author's abstract.*

12.7–128 551.506:629.13

*North American Aviation, Inc., **Atmospheric data for the BOLO Weapon System. Prepared by the Aero-Thermodynamics Section, Engineering Dept.** Contract AF 18(600)-1805, [Report] MD 58–260, Oct. 22, **1958.** 41 p. 8 figs., tables, 17 refs.—Atmospheric data applicable to the development of the BOLO Weapon System are presented herein. These data include average and seldom-exceeded values of temperature, pressure, density and their derivatives such as viscosity and speed of sound at altitudes from sea level to 100,000 feet. Wind profiles which may be associated with these "atmospheres" are also presented. Data for use in the general problem areas of turbulence, low-altitude flights, flights through frontal surface and flights through thunderstorms are also presented. *Subject Headings:* **1. Atmospheric data 2. Flight data 3. BOLO Weapon System.**—*Author's abstract.*

12.7–129 551.5:358.1

U. S. Dept. of the Army, **Meteorology for artillery.** Its *Technical Manual* 6-242, Oct. **1956.** 208 p. 121 figs., 6 tables. "This manual supersedes TM 20-240, Nov. 10, **1950** (*see* 9.6–18, June 1958, *Met. Abs.*)." **DWB** (M:623.54.U58m 1956)—A manual presenting and explaining the techniques of artillery ballistic meteorology and prescribing procedures for the application of these techniques. The ballistic meteorological problem and its solution, visual and electronic ballistic meteorological techniques, sound ranging meteorological techniques, and the determination of ballistic wind data by using radar are discussed. Arctic and jungle operations of meteorological sections liaison with the Air Weather Service (USAF), techniques of combining weather data from alternate sources, short cut methods, and the validity of ballistic meteorological data are described. The manual also considers maintenance, inspection, decontamination and distribution of equipment, and safety precautions. *Subject Heading:* **1. Artillery meteorology.**—*I.S.*

C. ASTRONOMY AND ASTROPHYSICS

C1. SOLAR PHYSICS

See also: **Audio-frequency electromagnetic noise during solar disturbance** (Watts), **12.7–142; Solar radio astron., Texas** (Maxwell), **12.7–143.**

12.7–130 551.590.21:061.3

†International Council of Scientific Unions, Brussels, **Ninth Report of the Commission for the Study of Solar and Terrestrial Relationships,** Pub. Paris, **1957.** 122 p. Bibliog. at end of each section. (For listing of contents, *see* 9(11):1463, Nov. 1958, *Met. Abs.* All articles abstracted separately.) **DWB**—This report consists of resumes and brief notes on progress made since the previous report was issued. New techniques of observation, the source and analysis of diverse solar radiation, the sun and the ionosphere, geomagnetism and solar corpuscles, radiation in the night sky, cosmic rays and the relationship between the sun and meteorology are the broad subjects discussed. Each item contains a list of pertinent references. *Subject Heading:* **1. Solar-terrestrial relationships.**—*E.Z.S.*

12.7–131 550.385:551.510.535:551.521.67

Matsushita, S., **On geomagnetic indices responsible for solar particles.** *Colorado. Univ. High Altitude Obs. Inst. for Solar-Terrestrial Research, Technical Report* No. 1, corrected and reissued May **1957.** p. 70–72. **DWB** (M13.1C719t)—Pt. I deals with geomagnetic indices which are subdivided into five types, namely: daily character figures $C(O\text{-}2)$, U- and U_1-measure, three-hour range indices, planetary three-hour range indices K and equivalent daily amplitude A_p. Pt. II, on solar particles, is concerned with high energy particles and charged particles and Pt. III, with magnetic and ionospheric variations by charged particles, Pt. IV gives an idea on indices responsible for solar particles. *Subject Headings:* **1. Geomagnetic-solar relationships 2. Ionospheric variations 3. Solar corpuscules.**—*M.L.R.*

12.7–132 523.74/5

Zirin, Harold (*High Altitude Obs., Colorado Univ.*), **Basic theories of solar activity.** *Colorado. Univ. High Altitude Obs. Inst. for Solar-Terrestrial Research, Technical Report* No. 1, corrected and reissued May **1957.** p. 21–26. 4 refs. **DWB** (M13.1C719t)—Phenomena of the interior are deduced from the four basic laws governing the behavior of a gaseous sphere in self-gravitational equilibrium. The method for obtaining a model of the solar interior is to start at the surface with known values of the density, pressure, luminosity and radius. Other main topics were: differential rotation and magnetic effects, theories for the general field of the sun and sunspots, theories for the relative coolness of sunspots and the corona. *Subject Heading:* **1. Solar activity theories.**—*M.L.R.*

12.7–133 523.75:535.33

Mustel', E. R., **O khromosfere nad solnechnymi piatnami.** [The chromosphere abov sunspots.] *Akademiia Nauk SSSR, Krymskaia Astrofizicheskaia Observatoriia, Izvestiia*

157–160, Dec. **1954.** 4 refs., 13 eqs. **DWB**—The hypothesis of the emission of solar electric currents is criticized. It is shown that the growth of such an electric current is limited by induction effects, as well as by electro-static fields. It is also pointed out that the maximum current which a solar corpuscular stream can carry is far too small to be of any geomagnetic interest. *Subject Heading:* **1. Solar electric currents.**—*I.S.*

12.7–139 551.521.1

Warwick, James W. (*High Altitude Obs., Colorado Univ.*), **Modes of energy transport from the sun to the earth.** *Colorado. Univ. High Altitude Obs. Inst. for Solar-Terrestrial Research, Technical Report* No. 1, corrected and reissued May **1957.** p. 14–20. 2 eqs. **DWB** (M13.1C719t)—The study is divided into two natural divisions—electromagnetic and corpuscular radiation. Under the general subject of electromagnetic radiation, the following types are discussed in detail: radio frequency emissions (600μ–30m), infrared (3μ–600μ), optical spectrum, near ultraviolet (1500 A–3000 A), Lyman ultraviolet (900 A–1200 A), far ultraviolet (10 A–1000 A), soft X-rays (1 A–10 A) and Gamma and hard X-ray radiation. Less is known about corpuscular radiation because of the difficulties of detection and measurement. Observations of corpuscular effects have been made by workers in the fields of cosmic rays, geomagnetism and auroras. *Subject Headings:* **1. Solar energy research 2. Electromagnetic radiation 3. Corpuscular radiation.**—*M.L.R.*

C2. ECLIPSES

See also: **Control of the ionosphere by short wave solar radiation** (Michard), 12.7–146.

12.7–140 551.590.24:551.510.535:551.594.12

Kawano, M. (*Electrotechnical Lab., Tokyo, Japan*), **Result of observation of the rate of ion pair production in the atmosphere during the solar eclipse, April 19, 1958.** *Journal of Geomagnetism and Geoelectricity*, Kyoto, Japan, 9(4):210–211, **1957.** fig. **DWB**—The rate of ion pair production in the ionosphere near the ground has been estimated with an ionization chamber using a vibrating reed electrometer which measured the saturated ionization current. This preliminary report showed the difference that existed during the solar eclipse of April 19, 1958 as compared with figures for other days—over twice in greatness at the time of eclipse maximum. Detailed result will be published later. *Subject Headings:* **1. Eclipse effects on ionosphere 2. Ionospheric ionization during eclipse 3. Ion production rate with height.**—*N.N.*

C3. MOON

See: **Artificial satellites of moon** (Buchheim), 12.7–65.

C4. METEORS

12.7–141 523.51

Struve, Otto (*Leuschner Obs., Univ. of Calif.*), **Making of the Barringer meteorite crater.** *Sky and Telescope*, N. Y., 18(4):187–189, Feb. **1959.** figs. (incl. photos). **DWB, DLC**—An interpretative review of E. J. Opik's paper (*Irish Astronomical Journal*, March 1958) cites the Barringer crater as a typical example of an impact crater. The Barringer crater (pictured schematically and shown in photograph) was caused by the fall at about 12 mi per second of a body of some two million tons, resembling an iron sphere 260 ft in diameter. Most of the mass of the meteorite must have vaporized or have backfired with great velocity from the center of impact. *Subject Heading:* **1. Meteorite craters.**—*E.Z.S.* Ⓢ

C5. RADIO ASTRONOMY

12.7–142 551.508.86:551.594.6

Watts, J. M. (*Natl. Bureau of Standards, Boulder, Colo.*), **An observation of audio-frequency electromagnetic noise during a period of solar disturbance.** *Journal of Geophysical Research*, Wash., D. C., 62(2):199–206, June **1957.** 5 figs., 6 refs. **DLC**—An unprecedented cosmic-ray increase occurred on Feb. 23, 1956. Recording apparatus for the regular collection of examples of whistlers began operating at Boulder, Colo. on the evening of Feb. 26—when hissing noise was being received. A narrow band receiver tuned to 15 kc showed no response to hiss on Feb. 26 but on March 3 noise was heard. Instead of being a steady hiss, the narrow band noise oscillated in amplitude, rising and falling with a period of about 2 sec. This suggested a changing spectrum in the vicinity of 15 kc. Pictures of the spectra are shown. Their essential features are: each spectrum was quite narrow. The center frequency was near 3 kc. The high frequency side of the peak in energy showed significant variation from hour to hour. The correlation of hiss amplitude with magnetic record is shown for March 3–4, 1956. The strong hiss was followed by only a small enhancement of the night airglow in the north. The hiss started eight hours after the initial field perturbation, but the fact that it coincided with the reversed phase may be significant. *Subject Headings:* **1. Solar radio noise 2. Cosmic ray increase, Feb. 23, 1956.**—*E.Z.S.*

12.7–143 523.164.3(764)

Maxwell, Alan (*Harvard College Obs.*), **Solar radio astronomy in Texas.** *Sky and Telescope*, N. Y., 17(8), June **1958.** Abstracted from reprint of 7 p. photos.—The equipment and various observations of intense emissions from solar disturbances of the Harvard Radio Astronomy Station at Ft. Davis, Tex. are described. The strength of violent outbursts is comparable with that of a television station 50 mi distant, although the signals originate 93 million mi away. The station is essentially concerned with sweep-frequency observations of active areas of the Sun, and it represents a radio counterpart of the optical solar observatory at Sacramento Peak, N. Mex. With observations made at Fort Davis and Australia, the Sun's radio emissions are monitored on special equipment for about 19 hrs of the day. Ft. Davis uses narrow-band receivers of higher sensitivity than those in Australia. The 35 mm camera film moves continuously half an inch a minute, recording the intensity of solar signals as a function of frequency and time. The equatorially mounted paraboloidal antenna, 28 ft in diameter, and its functions are described. The intensity of solar radiation, its variability and other characteristics change markedly with frequency, because emission of a given frequency originates as its own characteristic level in the solar atmosphere. The frequency co-ordinate is interpreted in terms of height in the sun's atmosphere. A giant explosion near the solar surface will eject intense, fast-traveling shock-waves and streams which are detected by the radio signals when they reach the upper levels of the solar atmosphere. The spectral observations show four distinct types of solar radio bursts: noise storms, slow-drift bursts, fast-drift bursts including a variation called U-bursts, and continuum radiation. The operations at Harvard Radio Astronomy Station started in September, 1956. The continuity of observations is much easier for radio observers than for those using optical equipment. The station's frequency range will shortly be extended from 100–580 megacycles to 25–580 megacycles to include radiations even further out in the corona. Location, equipment as well as records of the station are included in the illustrations. *Subject Headings:* **1. Radio astronomy of sun 2. Ft. Davis, Tex.**—*O.T.*

D. OUTER ATMOSPHERE

D1. COSMIC RADIATION

12.7–144 551.521.64

Srivastava, B. N. and Suri, A. N. (*Dept. of Physics, D. S. B. Govt. College, Naini Tal*), **Some features of extensive air showers of primary energy $\geqslant 10^{14}$ eV.** *Journal of Scientific and Industrial Research, Sec. B*, New Delhi, 19(6):221–222, June **1960.** 2 figs., table, 2 refs. **DWB, DLC**—Extensive air showers with energies $\geqslant 10^{14}$ eV, have been recorded at Naini Tal. Data for 10,000 showers recorded over a period of 4 months have been analyzed for solar diurnal and semidiurnal variation. The shower detector is described. The bi-hourly rates have been analyzed for diurnal and semidiurnal components and their amplitudes have been calculated. The rate of arrival of showers shows significant variation with solar time. The plot of the frequency of showers with a particular time interval of occurrence shows a Poisson type of distribution. Certain close showers that occur within a few seconds have been analyzed separately. Their plot shows some sort of flat distribution indicating thereby that the nature of close double or triple events might be different from the general pattern of extensive air showers. *Subject Headings:* **1. Air showers 2. Air shower data 3. Naini Tal, India.**—*E.Z.S.* ⓢ

12.7–145 551.521.64(09)

Swann, William Francis Gray (*Bartol Research Foundation of the Franklin Inst.*), **The story of cosmic rays** *Smithsonian Institution, Annual Report, 1956,* issued **1957.** p. 245–267. 6 figs., photos. **DLC** (Q11.S66)—This paper is on cosmic radiation, the assumed agency which explains at high altitudes the continual detachment of electrons from atoms. Cosmic radiation was, at first, assumed to be a single kind of radiation coming into our atmosphere from above. Yet this concept had to be modified as time progressed. The modified assumptions hold that there is a "primary radiation," consisting mostly of positively charged hydrogen atoms, which on entering our atmosphere, bombards the atoms of the atmosphere with the resulting emission of all sorts of other atomic particles which, in their totality, constitute cosmic radiation. *Subject Headings:* **1. Cosmic radiation theories 2. History of cosmic ray research.**—*I.S.*

D2. IONOSPHERE

See also: **Has met. become to professionalized** (Stagg), 12.7–39; **Effect of earth's magnetic field on m.u.f. calculations** (Davies), 12.7–115; **Sweep-frequency oblique incidence pulse transmissions** (Dieminger), 12.7–116; **Performance of an RF impedance probe** (Jackson, Kane), 12.7–118; **Effect of multipath distortion on the choice of operating frequencies for high-frequency communication circuits** (Bailey), 12.7–119; **Measurement of antenna gain** (Cottony), 12.7–120; **Vertical-incidence scatter** (Bowles), 12.7–121; **Constant ionosphere height** (Hepburn), 12.7–122; **Long-distance single F-hop transmission** (Dieminger et al.), 12.7–123; **Long distance ionospheric propagation** (Gerson), 12.7–124; **Effect of ionosphere on Doppler shift** (Hibberd), 12.7–125; **Geomag. indices responsible for solar particles** (Matsushita), 12.7–131, **Ion pair production during solar eclipse, April 1958** (Kawano), 12.7–140; **Magnetic disturbances, Arctic** (Nikolskiĭ), 12.7–171; **Irregular geomag. disturbances and influence of solar corpuscular streams on outer atmos.** (Bobrov), 12.7–173; **Ring-current effect** (Hines, Parker), 12.7–175; **Connection between Pc and F region** (Duffus), 12.7–179; **Turbulence in upper atmos.** (Matuura, Nagota), 12.7–394.

12.7–146 551.510.535:523.74

†Michard, Raymond, **Le contrôle de l'ionosphère par le rayonnement solaire de courtes longueurs d'onde.** [Control of the ionosphere by short wave solar radiation.] *International Council of Scientific Unions, Brussels, Ninth Report of the Study of Solar and Terrestrial Relationships.* Pub. Paris, **1957.** p. 59–67. 54 refs. **DWB**—A resume of statistical research on relationship between eclipse and the ionosphere, the E and F horizons, perturbations of the ionosphere and a discussion of the theory of the origin of the ionosphere. Work on the chemical composition of the ionosphere, the solar spectrum and the theory of different layers is summarized. *Subject Headings:* **1. Solar-ionospheric relationships 2. Ionosphere research.** —*E.Z.S.*

12.7–147 551.510.535

Martyn, D. F., **Survey of present knowledge of the F2 region.** (In: Physical Society, London, **Physics of the ionosphere,** London, Physical Society, **1955.**) p. 212–218. 12 refs., 3 eqs. **DWB**—The paper indicates what the author considers to be the salient features of the F2 region: the atmosphere at F2 height, ionization production, recombination coefficients, bifurcation, anomalies, winds and traveling disturbances, F2 storm phenomena and theories of F2 anomalies. *Subject Heading:* **1. F2 region.**—*E.K.*

12.7–148 551.510.535:551.594.13:550.388

Martyn, D. F., **Theory of height and ionization density changes at the maximum of a Chapman-like region, taking account of ion production, decay diffusion and tidal drift.** (In: Physical Society, London, **Physics of the ionosphere.** London, Physical Society, **1955.** p. 254–259. fig., table, 4 refs., 2 eqs. **DWB** (M10.535 C748)—Formulas are derived for $\partial Z_m/\partial t$ and $\partial N_m/\partial t$ (the time variations of the height and ionization density respectively, at the maximum of a Chapman-like region), taking account of ionization production, decay, diffusion, vertical drift and of height gradient in each of these influences. It is shown how the height gradient of drift appears to account adequately for main features of the geomagnetic anomalies in the world contours of Z_m and N_m; the anomalies are further enhanced by the virtual disappearance of vertical diffusion of ionization at the magnetic equator. *Subject Headings:* **1. Ionospheric physics 2. Ion mobility 3. Ionization density changes.**—*Author's abstract.*

12.7–149 551.510.535:550.388

Schmerling, E. R. (*Ionospheric Res. Lab., Penn. State Univ.*), **Effects of vertical diffusion of electrons near the magnetic equator.** *Nature*, London, 188(4745): 133–134, Oct. 8, **1960.** fig., 4 refs., 5 eqs. **DWB**—Observations at Huancaya (Peru), Talara (Peru) and Panama (Canal Zone) show that the electron density/height profiles in the vicinity of the magnetic equator are closely exponential in shape below the F2 peak during the day. A mathematical treatment is used to show the effect of vertical diffusion on such a profile. It is concluded that quite simple considerations of vertical diffusion account for the major features of the "geomagnetic anomaly" presented by Croom and others (*Nature*, 184(2003), **1959**) and that this anomaly consists of excess ionization, due to diffusion away from the equator, rather than a deficiency of ionization at the equator. *Subject Headings:* **1. F2 layer 2. Electron diffusion 3. Electron density profiles 4. Geomagnetic anomalies.**—*R.B.* Ⓢ

12.7–150 551.510.535:551.594.12

Slough, England. Radio Research Station, **Electron density profiles in the ionosphere during the I.G.Y.,** [Official communication from the DSIR Radio Research Station, Slough, England]. *Journal of Atmospheric and Terrestrial Physics*, London, 13(1/2):195–197, Dec. **1958.** 2 tables, 2 refs. **DLC**—The outline of a program for computations to obtain profiles of the distribution of electron density with height in the ionosphere from ionograms by the use of electronic computers is described. *Subject Headings:* **1. Electron density profiles 2. IGY electron density program.**—*O.T.*

12.7–151 551.508.96:551.510.535

Munro, G. H. (*C. S. I. R. O., Radio Res. Lab., Univ. of Sydney, Australia*), **Anomalies on ionosonde records due to traveling ionospheric disturbances.** *Journal of Geophysical Research*, Wash., D. C., 62(2):325–326, June **1957.** 5 foot-refs. **DLC**—Anomalies on ionosonde records due to traveling ionospheric disturbances have been described by Munro, Munro and Heisler, and H. W. Wells. This letter explains that the Geophysical Year offered an opportunity for world-wide study and proposed a network to function on World Days. An editor's note adds that adequate description of the nature of TID's in depth, as well as in horizontal dimensions, will aid the development and confirmation of theoretical attempts to explain the generation and propagation of these phenomena. *Subject Headings:* **1. Ionosonde records 2. Ionospheric disturbances.**—*E.Z.S.*

12.7–152 551.510.535

Valverde, J. F., **Motions of large-scale traveling disturbances determined from high-frequency backscatter and vertical incidence records.** Stanford Univ. Radio Propagation Lab., Contract AF 19(604)-1830, Scientific Report, No. 1, May 21, **1958.** 92 p. 31 figs., 3 tables, 22 refs. **DWB** (M(051)S785s)—The report describes a new method of study of large scale traveling disturbances in the F region of the ionosphere and discusses advantages and limitation of the method. Numerous diagrams and graphs illustrate the text. The method is based on a combination of oblique incidence backscatter sounding and vertical incidence sounding and is applied to the study of backscatter sounder records taken at Stanford since Sept. 1952, on the frequencies of 17.31 and 30.66 Mc. It is concluded that the new method is particularly useful for the investigation of large widespread disturbances. Examples are presented in which the disturbance wavefront, extended for more than 4000 km in an east-west direction. *Subject Headings:* **1. F region disturbances 2. Ionospheric disturbances.**—*I.S.*

12.7–153 551.510.535:551.594.13

New York. Univ. Institute of Mathematical Sciences. Div. of Electromagnetic Research, **Investigation of ionospheric particle interaction.** Contract AF 19(604) 1705, Final

Report, Nov. **1958.** 6 p.—This final report on the investigation of ionospheric particle interaction summarizes the achievements that have been made during the course of the project, Feb. 1, 1956 through Oct. 31, 1958. The five categories investigated include: a general scattering theory, many-particle scattering problems, molecular vibrations in collisions, molecular wave functions and a group of miscellaneous categories which show chemical exchange reactions that involve relatively light atoms and the interatomic potential energy of the particles. *Subject Heading:* **1. Ionospheric particle interaction.**—*N.N.*

12.7–154 **551.510.535:551.594.12**

†Renau, Jacques (*Cornell Univ., Ithaca, N. Y.*), **A study of observed spread F.** *Journal of Geophysical Research*, Wash., D. C., 65(10):3219–3240, Oct. **1960.** 21 figs., 4 tables, 40 refs. **DLC**—The main types of spread F have been illustrated, and in order to facilitate their study they have been categorized. Thereafter, our effort is concentrated in studying the morphology of a particular type of spread F observed at various magnetic and geographic latitudes (Northern Hemisphere). The total number of ionograms scanned during these studies amount to about a hundred thousand. The first of these studies shows that the spread F type B (sharp inner and outer frequency edge) may be due either to the bifurcation of the layers or to large horizontal patches of ionization with varying degrees of electron density and tilted in a manner to reflect specularly, with scattered echoes superimposed on the structures thus obtained. As for the amount of frequency spreading $fs = f_{\max} - f_{\min}$, the spread seems to be magnetically controlled, having its maximum at the magnetic north, decreasing with decreasing magnetic latitude down to 40°N, and increasing again at the magnetic equator. *Subject Heading:* **1. Spread F.**—*Author's abstract.* Ⓢ

12.7–155 **551.510.535:551.594.6**

Wait, James R. (*Natl. Bur. of Stands., Boulder, Colo.*), **On the theory of the slow-tail portion of atmospheric waveforms.** *Journal of Geophysical Research*, Wash., D. C., 65(7): 1939–1946, July **1960.** 4 figs., table, 15 refs., 20 eqs. **DLC**—The propagation of the slow-tail portion of atmospherics is considered from the waveguide-mode viewpoint. The source, which is a lightning discharge, is represented by a vertical dipole. The transient response of the distant electric field is then computed for various forms of the source current waveform. The results are then employed to reinterpret the experimental data of HEPBURN. As suggested by the present theory it is found that the observed separation t, between the oscillatory head of the atmospheric and the maximum of the slow-tail amplitude varies with distance p to the source according to a law of the form

$$(t_s)^{\frac{1}{2}} = A + B_p$$

The constant A is related to the pulse width of the source, and the constant B depends on ionospheric parameters. Values of effective ionospheric conductivities deduced from the theory are consistent with earlier results for the VLF band. The influence of nonvertical currents in the discharge channel is also briefly discussed. *Subject Headings:* **1. Atmospheric wave forms 2. Ionospheric conductivity 3. VLF bands.**—*Author's abstract.* Ⓢ

12.7–156 **551.510.535:551.510.62:061.3**

Lansinger, J. M., **Ionospheric absorption.** *Conference on Arctic Radio Wave Propagation, Second, Alaska Univ., Jan. 1956, Papers.* Issued May **1956.** p. 15–23. 2 figs. **DWB**—Gives an account of the research done in the field of ionospheric absorption. If we consider the situation of an electromagnetic wave traveling through a medium of charged particles, each particle will experience a force equal to the product of the charge and the field intensity at its location. Because of the presence of atoms and molecules in the ionosphere, electrons will collide with the molecules and will lose some energy by this collision resulting in transfer of kinetic energy from the electrons to the air molecules. The rate at which the free electrons collide with the molecules is an influencing factor in causing absorption. The correlation between ionization layer height and high absorption shows that the D region is the most likely location for the source of absorption. Absorption is nonuniform in direction. The details concerning the exact process are not certain. *Subject Heading:* **1. Ionospheric absorption.**—*A.H.K.*

12.7–157 551.510.535:551.510.62:517.512.2

Tomlinson, J. M., **A method of solving the integral equations for the vertical propagation**
f time-harmonic plane waves in anisotropic vertically-inhomogeneous, non-magnetic media.
ennsylvania. State Univ. Ionosphere Research Laboratory, Contract AF 19(604)-1304,
cientific Report No. 100, Feb. 1, **1958.** 59 p. fig., 2 tables, 14 refs., eqs. **DWB**—A pair
f coupled scalar integral equations are obtained for the horizontal components of the electric
ield of a time-harmonic plane wave which is propagating vertically in an anisotropic, vertically-
nhomogeneous, nonmagnetic stratum. A similar pair of coupled integral equations are
btained for the Forsterling-Rydbeck components of the same plane wave. For the practical
ases (e.g., the ionospheric lower E layer F.–R. coupling and reflection regions) in which the
tratum is bounded by strata where the F.-R. wave equations are practically uncoupled and
V.K.B., the space derivatives are eliminated from the boundary condition terms in the integral
quations. The integrals are approximated by Simpson's rule to obtain a system of algebraic
quations for the values of the components at evenly-spaced points in the stratum. Matrix
nanipulation almost completely diagonalizes this system, leaving, at the most, only three
onzero subdiagonals on each side of the main diagonal. For the case of negligible coupling
e.g., the lower E-layer F.-R. reflection region) the system of equations separates into two
ystems each having a matrix with one subdiagonal of −1's on each side of the main diagonal,
nd zero's elsewhere. The final triangularization of this matrix is accomplished with a repeti-
ive-loop digital computer program having only 30 instructions and using only 5 additional
vords of computer storage, regardless of the matrix size. Computer triangularization of the
×5, 9×9, 17×17, and 33×33 matrices for an F.-R. reflection region problem which has an
xactly-known wave solution yield reflection coefficients which converge to within 0.5% of the
orrect amplitude and 2° of the correct phase. *Subject Headings:* **1. Wave propagation equa-**
ions 2. Integral equations.—*Author's abstract.*

12.7–158 551.510.535:551.510.62:621.396.1

Obayashi, Tatsuzo (*Hiraiso Radio Wave Obs., Radio Research Lab.*), **VLF spectra of**
tmospherics propagated through the ionosphere. *Japan. Science Council. Ionosphere*
esearch Committee, Report of Ionosphere Research in Japan, 12(4):478–482, **1958.** fig.,
plates, 7 refs. **DWB, DLC**—Observation of sferics using special types of VLF spectroscopes
as been carried out at the Hiraiso Radio Wave Observatory since June, 1958. Simultaneously
he continuous measurement of the intensity of sferics at 27 kc/s has also been supplemented.
n this note the results obtained concerning the frequency spectrum of sferics are discussed.
ypical frequency spectrum of VLF sferics is graphically presented. It is concluded that the
esults obtained provide an excellent experimental base of the mode theory of VLF ionospheric
ropagation. *Subject Headings:* **1. Ionospheric VLF propagation 2. Sferics frequencies.**—*I.S.*

12.7–159 551.510.535(52/99)

*Ose, Masami; Aida, Kazuo and Okamoto, Hironobu, **Report on results of ionospheric**
ounding throughout the voyage from Japan to Antarctica. *Antarctic Record*, Tokyo, No.
:1–27, Feb. **1958.** 10 figs., 12 tables. In Japanese; English summary p. 1–2. **DWB**—
outine ionospheric sounding every 15 or 30 min. started on Nov. 11, 1956 at the southernmost
art of Japan on board the "Soya" and continued until her return on April 21, 1957. Records
aken, equipment and installations and the results of the operation are discussed. Spread
choes were observed in the high altitudes and are attributed to atmospheric conditions.
ubject Headings: **1. Ionospheric sounding 2. "Soya" Expedition, 1956–57.**—*N.N.*

12.7–160 551.510.535:537.56:539.12

Fellgett, Peter (*Univ. Cambridge*); Jones, R. Clark (*Polarioid Corp. Cambridge, Mass.*)
t al., **Fluctuations in photon streams.** *Nature*, London, 184(4691):967–969, Sept. 26, **1959.**
3 refs., 7 eqs. Also: **Comments** by C. W. McCombie, *Ibid.*, p. 969–970. 8 refs., 5 eqs.
WB—Two papers related in general to the subject of photon fluctuations. The first paper is
reexamination of the fluctual formula derived by JONES and FELLGETT on the one hand, and
y HANBURY, BROWN and TWISS on the other. It is pointed out that the discrepancy between
e two approaches was real and it was due to limitations in both methods of calculation as they
ere then conceived. Herein the two formulas are reconciled, and each found to be correct in

the circumstances for which it was originally derived, by taking account of the interaction between the incident, emitted and reflected radiation streams. The second paper examines two contradictory views on the fluctuations in the absorption and emission of photons by matter, offered by FELLGETT and by HANBURY, BROWN and TWISS. By applying the quasi-thermodynamic approach to a particular model, it is shown that the results agree with the detailed calculations in supporting the second point of view, and that for this model, at least, the conflict is resolved. *Subject Headings:* **1. Ionization of gases 2. Photons. I. Twiss, R. W.** (*Univ. Sydney*) **II. McCombie, C. W.**—*I.S.* Ⓢ

D3. GEOMAGNETISM

See also: **Effect of earth's magnetic field on m.u.f. calculations** (Davies), 12.7–115; **Geomag. indices responsible for solar particles** (Matsushita), 12.7–131; **Height and ionization density changes** (Martyn), 12.7–148; **Vertical diffusion of electrons near magnetic equator** (Schmerling), 12.7–149; **Solar influence on terrestrial phenomena** (Bernard), 12.7–447.

12.7–161 550.38:538.69

Takeuchi, Hitoshi (*Tokyo Univ.*), **A contribution to the dynamo theory of the earth's main magnetic field.** *Zizin*, Ser. 2, 12(3):122–129, [1959?]. Reprinted as *Tokyo Univ. Geophysical Institute, Geophysical Notes*, 12(2), **1959.** Contribution No. 16. fig., 7 refs., 4 eqs. In Japanese; English summary p. 122. **DWB, DLC**—The essence of the dynamo theory of the earth's main magnetic field is that we have groups of magnetic fields which can be maintained in a stationary manner by some fluid motions of a certain magnitude. The problem considered here is what the time characteristics of these groups of magnetic fields are when driven by motions of larger or smaller magnitude than those required just to keep the fields stationary. As expected, when driven by motions of larger or smaller magnitude, the fields develop or decay exponentially. In the second half of this paper, we have simplified the mathematics of induction of T_2O field from S_1O field by T_1O motion, which is the most important process in the dynamo theory of the earth's magnetic field. *Subject Headings:* **1. Earth's magnetic field 2. Dynamo theory of magnetic field.**—*Author's abstract.* Ⓢ

12.7–162 537.21:538.69:532.59

Bossy, L. and De Vuyst, A., **Relations entre les champs électrique et magnétique d'une onde de période très longue induits dans un milieu de conductivité variable.** [Relation between the electric and magnetic fields of very long wave period induced in a medium with variable conductivity.] *Geofisica Pura e Applicata*, Milan 44:119–134, Sept./Dec. **1959.** 9 figs., 10 refs., 4 eqs. French and English summaries p. 119. **DLC**—The ratio between amplitudes and the difference of phases of pulsations of the magnetic and electric fields recorded at the ground level, the periods of which being superior to one second, depends on the variation of the conductivity with the depth. In view of interpreting the results of the observations made at the Centre de Physique du Globe at Dourbes, various types of conductivity distributions are studied, and particularly a composite model, constituted of a uniform conductivity layer, extended by a medium where the conductivity variation is continuous seems to represent the experimental results. *Subject Headings:* **1. Electric field 2. Magnetic field effects.**—*Authors' abstract.* Ⓢ

12.7–163 **551.515.4**:550.385.37

Wilcox, J. B. (*USN Lab., White Oak, SS, Md.*), and Maple, Elwood (*Air Force Res. Cen., Bedford, Mass.*), **Audio-frequency fluctuations in the geomagnetic field.** *Journal of Geophysica Research*, Wash., D. C., 65(10):3261–3271, Oct. **1960.** 6 figs., 32 refs. **DLC**—Audio-frequency geomagnetic fluctuation spectra are reported for three North American stations covering a latitude range of 41°. Recording stations were located at Panama City, Fla.; White Oak, Md and Point Barrow, Alaska. Fluctuation intensities throughout the frequency range 70 to 16,000 cps were observed to decrease with increasing latitude. Between 100 and 1000 cps fluctuation amplitudes were inversely proportional to about the 3/2 power of frequency, the spectral slopes becoming somewhat steeper with increasing latitude. Between 1500 and 8000 cps, amplitudes decreased more rapidly with latitude than did those at other frequencies, and a

ectral minimum was evident in this frequency range at Point Barrow. The vertical fluctua-
n component was smaller and decreased more rapidly with latitude than did the horizontal
mponents. It is concluded that thunderstorm activity is the major source of the fluctuations
roughout the audio-frequency range, with the magnetic atmospherics being generated chiefly
the lower altitudes and propagated poleward. The relationship of the observed fluctuations
thunderstorm distributions is discussed. There is considerable agreement with the results
others, although a few discrepancies are apparent. *Subject Headings:* **1. Geomagnetic
ctuation spectrum 2. Radio noise 3. Audio-frequency geomagnetic fluctuations.**—
thors' abstract. ⓢ

12.7–164 538.56:550.38

Vladimirov, N. P. and Nikiforova, N. N., **O Spektre variatseiĭ estestvennogo elektro-
gnitnogo polia Zemli.** [Spectrum of variations of the natural electromagnetic field of the
th.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 12:1867–1869, Dec. **1959.** 4 figs.,
refs. **DWB, DLC**—In connection with the IGY program, an extensive study has been
ried out since 1957 on the variation of the natural electromagnetic field. A station capable
recording signals in a range of 0.3–1000 H_z has been set up. The observations in the fre-
ency interval of 0.3—100 H_z are analyzed. With the aid of a block diagram, the authors
scribe the instrumentation and operation of the station. Graphs showing the distribution of
riations of the electrical field by frequency and the distributions of the variations of electrical
ld by amplitude are presented. The data obtained indicate the following: the electro-
gnetic field of the earth has a continuous spectrum within the interval 0.3–100 H_z; the
tribution of frequency oscillations at different times of day appears practically uniform
ring observations made in Kursk Region; the intensity of variation of the field depends upon
quency and time of day; with decreased frequency the amplitude of oscillation increased;
intensity of variation by day is somewhat greater than at night (local time); the mean
plitude of horizontal components of the electrical field equals 0.1 mv/km; the amplitudes
the components of the magnetic field are of the order 10^{-7}–10^{-8} e. *Subject Headings:*
Earth's magnetic field 2. Magnetic field variations.—*I.L.D.* ⓢ

12.7–165 551.501:550.38(71)

Conley, Joseph M. (*Aberdeen Proving Grd., Md.*), **Earth's main magnetic field to 152
ometers above Fort Churchill.** *Journal of Geophysical Research*, Wash., D. C., 65(3):
74–1075, March 1960. 2 figs., 3 refs. **DLC**—The experimental data indicate that the earth's
in field at Churchill is represented by $F=F_0[a/(c+h)]^3\pm20\gamma$ where $F_0=61{,}240\gamma$, $a=6065$
, and h is altitude above sea level. This equation is meant only as an empirical relation for
itudes less than 150 km. This represents a difference of about -1.32γ/km altitude from a
ntered dipole field. *Subject Headings:* **1. Earth's magnetic field 2. Fort Churchill, Canada.**
E.Z.S. ⓢ

12.7–166 550.384.31

*†Fanselau, G. and Kautzleben, H. (*both, Geomagnetisches Inst. der D. Akademie der Wissen-
aften, Berlin, Potsdam*), **Die analytische Darstellung des geomagnetischen Feldes.** [Ana-
ical representation of the geomagnetic field.] *Geofisica Pura e Applicata, Milan*, 41:33–72,
58. 9 figs., 18 tables, 24 refs., 73 eqs. German and English summaries p. 33–34. **DLC**—
e results of a new analysis of the geomagnetic field for the epoch 1945 in a series of spherical
rmonics to the 15th degree are discussed. It is stated that it is not very important at the
esent state of material of observation and of analytical methods to extend the development
geomagnetic potential beyond the 6th degree. Otherwise the computed coefficients are not
eater than the errors of the computation. In the limits of the precision already reached it is
ssible to derive the geomagnetic field only from sources within the earth. Just like the
alyses of VESTINE et al. and of CHATRABARTY for the same epoch, the present computation
the geomagnetic potential does not allow to say as little about an exterior part of the geo-
gnetic field as about a nonpotential part. Further on it is shown in what manner the very
ensive material would be used to make more detailed remarks upon the structure of the
omagnetic field. Discussing the mean values of the spherical harmonics in the series it is
ssible to obtain some information about the size of the mean values of higher degree. The

mean values on different spherical surfaces are discussed. According to that it is plausible tha
the vicinity of the limit of core is the upper limit for the sources causing the main geomagneti
field. Next the so-called "structure-elements of the geomagnetic potential" are inspected
Regarding these values in relation to some different diameters of the earth it is shown that th
geomagnetic field has the greatest tendency to a zonal distribution in all quantities of the serie
in regard to the axis of the earth's rotation. Therefore this axis has a special significance for th
geomagnetic field. By a comparison with the description of the height and depth of the earth
surface by Prey follows that there is no remarkable connection with the geomagnetic field
Subject Headings: **1. Geomagnetic field 2. Earth's magnetic field.**—*Authors' abstract.*

12.7–167 550.385 :551.521.6

Loughnan, C. J. (*Awarual Radio, Invercargill, New Zealand*), **Motion of geomagnetic fiel
lines.** *Nature*, London, 185(4718):33–34, April 2, **1960.** 4 refs. **DWB**—Primary aurora
particles, from the Van Allen radiation belt or interplanetary space, travel down to the uppe
atmosphere along lines of force at the geomagnetic field. Hence they strike the atmosphere i
regions which move with the field lines when these are distorted. The purpose of this communi
cation is to show that this motion of the impact regions can only be very slow, because th
high conductivity of the earth's interior limits the field distortion. *Subject Headings:* **1. Geo
magnetic field variations 2. Van Allen belts 3. Auroral particles.**—*E.Z.S.* Ⓢ

12.7–168 550.383.4 :551.521.6

†Beard, David B. (*Univ. Calif., Davis, Calif.*), **The interaction of the terrestrial magneti
field with the solar corpuscular radiation.** *Journal of Geophysical Research*, Wash., D. C
65(11):3559-3568, Nov. **1960.** 3 figs., 2 tables, 17 refs., 40 eqs. **DWB, DLC**—In this invest
gation the terrestrial magnetic dipole field is assumed to exist in an intense stream of proton
and electrons emanating from the sun which behaves as a diamagnetic medium terminatin
the earth's magnetic field at about 7 earth radii on the daylit side and up to perhaps 100 eart
radii on the night side of the earth. By detailed examination of particle trajectories the inter
action between plasma and magnetic field is shown to occur within a negligibly thin curren
sheath enveloping the earth. Numerical solutions of the differential equation for the sheat
surface reveals an approximately spherical surface on the daylit side giving rise to a mor
complicated expanding surface on the night side, including a prominent bump of reverse
current sheath near the magnetic poles. *Subject Headings:* **1. Earth's magnetic field 2. Co
puscular radiation.**—*Author's abstract.* Ⓢ

12.7–169 550.380.12 551.521.67 :550.388.

Mayaud, P. N., **Un nouveau système de coordonnées magnétiques pour l'étude de
haute atmosphère: les coordonnées de l'anneau équatorial.** [A new system of magnet
co-ordinates for the study of the upper atmosphere: the equatorial ring co-ordinates.] *Annal
de Géophysique*, Paris, 16(2):278–288, April/June 1960. 3 figs., table, 5 refs. French, Englis
and Russian summaries p. 278. **DLC**—Because of the part played in the phenomena of co
puscular origin by the lines of force of the real magnetic field, it is proposed that these ph
nomena be classified by substituting for the dipole co-ordinates a representation of the re
field obtained from the extremities of the lines of force of the real field which issue from th
circumferences of the equatorial plane. With the aid of the calculations based on harmon
spherical analysis carried out by B. Hultqvist, charts are drawn which permit the co-ordinat
in this new system for any point on the earth's surface to be easily determined. Some exampl
justify the soundness of this substitution. *Subject Headings:* **1. Geomagnetic field 2. Ge
magnetic co-ordinates 3. Magnetic effects on corpuscular radiation.**—*Author's abstract.* Ⓢ

12.7–170 551.594.12 :550.388 :662.2 :539

Christofilos, N. C. (*Lawrence Rad. Lab., Livermore, Calif.*), **The Argus Experimen**
Journal of Geophysical Research, Wash., D. C., 64(8):869–875, Aug. **1959.** 15 eqs. **DL**
Also in: Symposium on Space Physics, Wash., D. C., April 29–30, 1959, **Exploration of Spac**
Ed. by Robert Jastrow, N. Y., Macmillan, **1960.** p. 42–48.—A geophysical experiment
global scale was conducted last fall. Three small A-bombs were detonated beyond the atmo
phere at a location in the south Atlantic. The purpose of the experiment was to study t

pping of the relativistic electrons (produced by the β-decay fission fragments) in the geo-
gnetic field. The released electrons are trapped by this field oscillating along the magnetic
es between two mirror points. In addition to this motion the electrons drift eastward,
ating a thin electron shell around the earth. The lifetime and location of the thus-created
bal electron shell were measured by satellite- and rocket-borne instruments. Auroral
ninescence was observed at the conjugate points. The electron shell exhibited remarkable
bility during its lifetime. No motion of the shell or change in its thickness was detected.
is experiment was proposed by the writer a few weeks after the launching of the first Sputnik.
ter intensive investigations by several scientists it was decided by the end of April 1958 to go
ead with the experiment. All the necessary preparations were accomplished in the amazingly
rt time of 4 months. The usefulness of such electron shells for interpreting geophysical
enomena and possible future experiments are discussed. *Subject Headings:* **1. Argus Experi-
nt 2. Artificial electron clouds.**—*Author's abstract.* Ⓢ

12.7–171 551.594.52:551.510.535:550.388.2(98)
Nikol'skiĭ, A. P., **Magnitnye vosmushcheniia v okolopoliusnoĭ oblasti Arktiki.** [Magnetic
turbances in the area near the pole in the Arctic.] *Problemy Severa*, Moscow, No. 1:116–132,
58. A paper in which it is shown that auroras and magnetic ionospheric disturbances are
st intensive and most frequent in the ring zone situated at a distance of 23–25° from the
e of uniform magnetization. This fact is of great practical importance, as radio waves of
ctic and trans-Arctic radio paths crossing this zone lose much of their energy. This leads
a deterioration of radio communication and, in case of strong disturbances, to a complete
sation. An analysis of peculiarities of the geographic distribution of magnetic disturbances
the area near the pole, based on observations made in the Central Arctic region lead to the
nclusion that besides the already known zone there probably exists a second internal zone of
reased intensity of magnetic disturbances, a schematic drawing of which is shown. *Subject
adings:* **1. Auroral frequencies 2. Magnetic disturbances 3. Magnetic poles 4. Central
ctic region.**—*A.M.P.*

12.7–172 550.385.43
Dessler, A. J.; Francis, W. E. and Parker, E. N., **Geomagnetic storm sudden-commence-
nt rise times.** *Journal of Geophysical Research*, Wash., D. C., 65(9):2715–2719, Sept. **1960.**
igs., 2 tables, 11 refs. **DLC**—Adopting the view that the sudden commencement of a
omagnetic storm (SC) is the result of the impact on the geomagnetic field of an abrupt solar
sma front, the form of the SC observed on the surface of the earth is investigated. A model
constructed to represent the shape of the geomagnetic field boundary as perturbed by the
ar plasma. Calculations (carried out in the equatorial plane for simplicity) show that,
ardless of how abrupt may be the impact of a solar plasma front on the geomagnetic field, the
riation in hydromagnetic transit times from different positions on the boundary, down to a
nt on the surface of the earth, yields SC rise times of several minutes at ground level. These
es are in agreement with the observed SC rise times. *Subject Headings:* **1. Geomagnetic
rms 2. Sudden Commencements.**—*Authors' abstract.* Ⓢ

12.7–173 550.385:551.521.67:551.510.536
Bobrov, M. S., **Tipy irreguliarnykh geomagnitnykh vozmushcheniĭ i mekhanizmy voz-
stviia solnechnogo korpuskuliarnogo potoka na vneshniuiu atmosfery.** [Types of irregular
magnetic disturbances and the mechanisms of interaction of a solar corpuscular stream
h the outer atmosphere.] *Astronomicheskiĭ Zhurnal*, Moscow, 37(3):410–424, May/June
0. 7 figs., table, 18 refs. Russian and English summaries p. 410–411. Transl. into
glish in *Soviet Astronomy AS*, New York, 4(3):392–404, Nov./Dec. **1960. DLC**—
e comparison of IGY magnetograms obtained for a number of days with different geomag-
ic activity (K_p from 0 to 9) shows that there are three independent and simultaneous types
rregular geomagnetic disturbances D_i: synphase (*S*), local (*L*) and permanent (*P*). Some
racteristics of these types have been reported previously. In the present study their main
perties are considered and the possible mechanisms responsible for them discussed qualita-
ely in connection with the influence of solar corpuscular streams on the Earth. *S*-disturb-
es prevail in the *S*-belt, which extends to low and middle geomagnetic latitudes. The

northern (southern) boundary of the S-belt is at a distance of about 2500 km from the norther (southern) auroral zone. The S-disturbances are of the order of 50–200γ. As a rule the H- and Z-components are of positive sign. It is very probable that they are due to the com pression of the outer atmosphere by large (~600 earth radii) condensations of solar plasma This compression travels through the atmosphere hydromagnetically, producing a positiv S-peak in low and middle latitudes. Simultaneously transversal (Alfvén) waves shoul propagate along lines of force to auroral zones and cause modified disturbances (S') of com paratively complicated structure in these zones. These S'-disturbances were actually detecte on IGY magnetograms by the author. L-disturbances prevail in L-belts, adjoining S-belts and extend to the outer boundary of the nearest polar cap. The properties of these dis turbances are well known (intensity to 2000γ, decreasing with the distance R from aurora zone; night maximum; in most cases a negative sign of the horizontal component; the existenc of well pronounced quiet intervals between peak groups; etc.). Probably they are due to sma (~100–300 km) scraps of solar plasma, which penetrate the outer atmosphere and move alon trajectories resembling stormerian ones towards high sectors of auroral zones (13). Th distortion of magnetic lines of force by these formations is apparently the direct cause c L-disturbances. P-disturbances prevail in P-belts (polar caps). They are permanent in tw respects: 1) they can be observed almost daily, including magnetically quiet days (K_p~0–1 2) on more disturbed days they follow one after another almost without quiet interval Possibly they are caused by the permanent spurts of solar plasma, which penetrate the oute atmosphere in points with zero pressure of the geomatic field. *Subject Headings:* **1. Geomag netic disturbances 2. Solar corpuscular influences on upper atmosphere 3. Outer atmos phere.**—*Author's abstract.* ⓢ

12.7–174 550.386

Nikol'skiĭ, A. P., **O zavisimosti srednego urovnia magnitnoĭ aktivnosti ot shiroty i dolgot** [Dependence of the mean level of magnetic activity on latitude and longitude.] *Problem Arktiki i Antarktiki*, Leningrad, No. 3:85–91, **1960**. 2 figs., 3 tables, 8 refs. **DWB**—Th intensity of magnetic disturbances is associated with definite geographic distribution. In hig latitudes of the Arctic and Antarctic the ring areas are in the geomagnetic latitude $\phi = \sim 65–68$ where the frequencies of magnetic disturbances and their intensities are maximum. In th direction of the equator these intensities and frequencies are lowered. The consideration dependence of intensity of magnetic distribution only from the geomagnetic latitude has a important role in studies of the magnetic ionospheric disturbances and aurora borealis. On th basis of this consideration the selection is made of the limits of the amplitudes of magnet variations in the system of the K-indexes of magnetic activities. This method was develope by T. Bartels. Variations of the values of the K-indexes, determined on the observation 50 stations located around the whole world, are graphically analyzed in respect to avera monthly and for 5 days data of more intensified magnetic storms. The discussion is extende to an analysis of the tabulated data on the (EK) obtained at 15 Soviet stations during Octobe December 1956. The variations of (EK), corresponding to the listed stations, are plott separately for each month and average total for each station. The discussion is concluded wi schematic arrangement of the geographic distribution of the high magnetic disturbances arou the Northern Hemisphere with Arctic zone in the center. The boundaries of four ellipti areas, corresponding to the high intensity magnetic-ionospheric disturbances are drawn on t Northern Hemisphere map. *Subject Headings:* **1. Magnetic activity 2. Magnetic disturban distribution.**—*N.P.S.* ⓢ

12.7–175 551.510.536:551.594.13:550.38

Hines, C. O. (*Defence Res. Board, Ottawa, Canada*) and Parker, E. N. (*Univ. of Chicag* **Statement of agreement regarding the ring-current effect.** *Journal of Geophysical Resear* Wash., D. C., 65(4):1299–1301, April **1960**. 2 figs., 11 refs. **DLC**—Agreement on the behav of a new model presented by Dessler and Parker (1959) leads authors to accept the view th the circulating charge high in the exosphere can indeed be associated with a decrease of ge magnetic field at ground level in a reasonably short time and, therefore, may be responsible the main phase of a geomagnetic storm. *Subject Headings:* **1. Ring current effect on ge magnetic field 2. Geomagnetic storms.**—*E.Z.S.* ⓢ

12.7–176 550.385.36

†Fukushima, Naoshi (*Tokyo Univ.*), **Some remarks on the morphology of geomagnetic bays.** *ournal of Geomagnetism and Geoelectricity*, Kyoto, 10(4):164–171, 1959. **DWB, DLC.** Re- rinted as *Tokyo Univ. Geophysical Institute, Geophysical Notes*, 12(2), 1959. Contribution o. 22. 5 figs., 21 refs. **DWB, DLC**—The unequal occurrence frequency of positive and egative geomagnetic bays at various places over the world can be attributed to the fact that ost cases of geomagnetic bays are polar elementary storms, especially negative ones; the ypical or idealized disturbance field of which is represented by an overhead current system omposed of an intense westward current of narrow longitudinal width along the auroral zone nd the counter current flow over the whole remaining part of the world. This result must be arefully taken into consideration when the average current system for geomagnetic bays is ealt with. The systematic rotation sense of the disturbing force vectors of bays observed verywhere in middle latitudes, clockwise in the forenoon and counter-clockwise in the after- oon, is a result of the systematic progressive change in the overhead current system during the ourse of bays. Some other important problems to be examined are also suggested. *Subject Ieading:* **1. Geomagnetic bays.**—*Author's abstract.* ⓢ

12.7–177 550.384:550.3:061.3

Onagawa, Japan. Magnetic Observatory, **Geomagnetic rapid variations observed at the bservatory during the International Geophysical Year, Pt. 1.** *Tôhoku University, Science eports, 5th Ser., Geophysics*, Vol. 11, Supp., March 1960. 49 p. 49 figs., 4 tables. (*I.G.Y. eport of the Onagawa Magnetic Observatory*, No. 2). **DWB, DLC**—The geomagnetic rapid ariations observed at the Onagawa Magnetic Observatory for the period 1 July to 31 Dec. 1957 re tabulated and graphically represented. Storm sudden commencement, sudden impulse, eomagnetic bay and solar flare observations are listed. These data were obtained by the ormal magnetometer and high sensitive rapid run magnetometer. The induction magne- ometer and high sensitive rapid run magnetometer were used for the measurement of geomag- etic rapid pulsation. *Subject Headings:* **1. Geomagnetic variations 2. IGY geomagnetic rogram.**—*I.S.* ⓢ

12.7–178 550.385.3:621.396.8

Heirtzler, J. R.; Nichols, D. L. and Santirocco, R. A., **Some observations of the geo- agnetic fluctuation spectrum at audio frequencies.** *Journal of Geophysical Research*, Wash., . C., 65(8):2545–2547, Aug. 1960. 2 figs., table, 10 refs. **DLC**—During the past year quivalent spectrum levels of the background noise in the region 10 to 10,000 cps were measured t two sites in the northeastern U. S. The data are plotted and the curves compared with those btained by Wilcox and Maple. Below 100 cps the fluctuations in level are likely to be ubstantially greater than at higher frequencies. Results at all frequencies are between one nd two orders of magnitude greater than the spectrum levels reported by Willis (1948). he power of the two-frequency correlation technique in discriminating between time- ncoherent noise source is clear. *Subject Headings:* **1. Geomagnetic fluctuation spectrum . Audio frequency geomagnetic fluctuations 3. United States.**—*E.Z.S.* ⓢ

12.7–179 550.386:551.510.535.4

Duffus, H. J. (*Canadian Services College, Royal Roads Victoria, British Columbia*), **A con- ection between Pc and the F region.** *Nature*, London, 188(4752):719–721, Nov. 26, 1960. g., table, 19 refs. **DLC**—The main subject of this paper is the maximum of the micropulsa- ions of the *Pc* type which occurs on the sunlit side of earth. Figures are given showing the atitudinal variation of the ratio of the 12 hr/24 hr harmonic components of the occurrence *Pc* nd *N*(*h*), the ionosphere electron density, at 280 km averaged over the IGY. These figures re used as a basis for discussion as to whether the source of the *Pc* oscillations lies above the onosphere and the amplitudes at the surface of the earth are reduced by ionospheric shielding. *ubject Headings:* **1. Electromagnetic micropulsations 2. Ionospheric electron density.**—*R.B.* ⓢ

12.7–180 662.2:539.1:550.375:550.385.43

Launay, L. and Beccaria, M. (*both, Inst. de Météorologie et de Physique du Globe de l'Algérie*), **erturbations magnétiques et telluriques enregistrées à Tamanrasset à la suite des explosions**

nucléaires à haute altitude dites "Expérience Argus" (août-septembre 1958). [Magnetic and telluric disturbances recorded at Tamanrasset after the high altitude nuclear explosions during the Argus Experiment (Aug.–Sept. 1958).] *Annales de Géophysique*, 16(2):289–290, April/June **1960.** 7 plates, 3 refs. French and Russian summaries p. 289. **DLC**—The nuclear explosions of the Argus Experiment provoked magnetic and telluric pulsations at Tamanrasset, the periods of which were relatively short (reaching nearly the inferior observable limit of 1 second). The recorded frequency spectrum stretches from 0.05 to 1 cycle per sec. It was noted however that each apparatus registered a perturbation of which the dominating period corresponded to its field of maximum sensitivity. *Subject Headings:* **1. Nuclear explosion effects 2. Geomagnetic pulsations 3. Telluric currents 4. Sudden commencements 5. Argus Experiment 6. Tamanrasset, Algeria.**—*Transl. of authors' summary.* Ⓢ

12.7–181 550.371

*†Yoshimatsu, Takasaburo, **Universal earth-currents and their local characteristics.** *Kakioka, Japan. Magnetic Observatory, Memoirs*, Supplementary Vol. 1, May **1957.** 76+29 p. 61+16 figs., 26+10 tables, 60+19 refs., eqs. Appendix (29 p.): **Measurement of earth-current potentials and its reliability. DWB**—The fundamental problems of earth current measurement involve the method and apparatus used, the performance and maintenance of field equipment, and the various kinds of errors that are introduced while the measurements are carried out. This paper discusses the universal earth currents and their local characteristics under the following headings: 1. the principal, or restricted, direction of the variation of earth currents; 2. the time variations of the mode of *Sq* of earth currents and solar activity; 3. the magnitude of earth current potential gradient and its local characteristics; 4. some characteristic features of the disturbance field of earth currents observed in Japan. *Subject Headings:* **1. Earth currents 2. Japan.**—*N.N.*

12.7–182 550.380.6:550.381.21(438)

Przypkowski, Tadeusz (*Jędrzejów*), **On the magnetic declination obtained from observation by Martin Bylica of Olkusz around 1485.** *Acta Geophysica Polonica*, Warsaw, 7(2):176–181, **1959.** 6 refs. Polish summary p. 181. **DWB, DLC**—Two works on the earliest records of declination by Balmer and Zinner are discussed and their main findings are compared with the results presented in an earlier paper by the author, published in the present journal (1956). According to Zinner, John Dorn (1436–1509) was the author of the complete instrumental equipment of Martin Bylica of Olkusz, as well as a number of sundials in European and American collections. Declination data engraved at the bottom of compasses on various sundials of the early period (1463–1491) are tabulated and compared with the older declination value marked by Bylica's globe. *Subject Headings:* **1. Magnetic declination data 2. History of geomagnetism.**—*I.S.*

12.7–183 551.382.3:551.762

Girdler, R. W. (*Columbia Univ.*), **Possible reversals of the earth's magnetic field in the Jurassic period.** *Nature*, London, 184(4685), Supp. No. 8:540–541, Aug. 15, **1959.** 11 refs. **DWB**—A note on a recent study of the natural remanent magnetization of the upper Lias Sands western England. The seventeen samples collected from two sites were found to have reverse directions of magnetization. Samples a little higher and lower in the succession were found to be normally magnetized. The present paper gives the numerical details of the results and discusses the reasons for considering the rocks in question to possess a stable magnetization. *Subject Headings:* **1. Geomagnetic field anomalies 2. Jurassic period 3. Paleomagnetism.** —*I.S.*

12.7–184 550.382.3

Gough, D. I. and van Niekerk, C. B. (*both, Natl. Phys. Res. Lab., Council Scientific and Ind. Res., Pretoria*), **A study of the paleomagnetism of the Bushveld Gabbro.** *Philosophical Magazine, London*, 8th Ser., 4(37):126–136, Jan. **1959.** 5 figs., 3 tables, 7 refs. **DWB**—Data are presented on the natural remanent magnetization at five sites of the Main Gabbro zone of the Bushveld Igneous Complex. It is found that the directions of N.R.M. at five sites would agree more closely if the rock at each site were rotated about the strike of the pseudostratification so as to make its dip zero. This indicates that the gabbro became magnetized before the crust subsided to form the basin in which the complex now lies. The same results show that the N.R.M. of the gabbro has been stable since before the crustal subsidence. Stability of the N.R.M. is further demonstrated by the highly consistent directions of magnetization making a large angle with the present field. After correction for dip, and on the assumption that the gabbro was magnetized in the field of a geocentric dipole, the mean north magnetic pole from the five sites lies at 23°N, 36°E. The age of the complex is close to 2.0×10^9 years. The palaeomagnetic results show that the crust supported the load due to the Gabbro intrusion without subsidence for at least the time taken by this intrusion to cool to the curie temperature of its ferri-magnetic constituents. A lower limit to this time is estimated, on reasonable assumptions, to be of the order of 10^5 years, so that the South African crust 2×10^9 years ago appears to have had very considerable strength. *Subject Headings:* **1. Paleomagnetism 2. Magnetization of rocks.**—*Authors' abstract.*

12.7–185 551.583.7:550.382.3:521.93

Komarov, A. G., **Paleomagnitnye issledovaniia nizhnepaleozoĭskikh bazal'tov Ukrainy.** [Paleomagnetic investigations of the lower Paleozoic basalts of the Ukraine.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 8:1219–1225, Aug. **1959.** 4 figs., 4 tables, 9 refs. **DWB, DLC**—Natural remaining magnetization of volcanic rocks and of minerals bounded with them is considered as the result of thermo-magnetizing during formation processes in the earth's magnetic field. Direction of a vector of natural remaining magnetization (I_n) serves as an indicator of magnetic field in the genetic period of this rock. Geological position and absolute age of Ukrainian basalts are described in reference to different regions. The method of measurement and apparatus for determination of size and direction of the vector of natural remaining magnetization in the three dimensional coordinates are briefly outlined with graphic illustration and tabulated data for different regions. The direction of geomagnetic pole is computed with orientated vector of natural remaining magnetization of basalt. Good correlation of the geomagnetic latitudes of different periods of geological history with the paleoclimatic indicators shows that the change of the earth's magnetic field, determined by paleomagnetic investigation of volcanic rocks, is connected with migration of the geographic poles, i.e., with changes of inclination of the earth's axis. *Subject Headings:* **1. Paleomagnetic investigations 2. Remanent magnetism 3. Polar displacement 4. Ukrainian S.S.R.**—*N.P.S.*

D4. AURORAS

12.7–186 551.594.51:546.17

Hunten, D. M., **Relative intensity of nitrogen band systems in aurora.** Saskatchewan. Univ. Physics Dept., Contract AF 19(604)-1831, Scientific Report No. BR-22, Dec. **1959.** p. 3 tables, 12 refs.—Relative intensities are derived for certain bands of the following systems: N_2 Vegard-Kaplan, first positive, and second positive; N_2^+ first negative and Meinel. Already available auroral spectra, most of them photoelectric, were used. Factors relating the photon intensity of a band to that of the whole system are derived or collected, and used to find typical relative photon intensities for each system. Much better results could be obtained from spectra taken especially for the purpose, and some of the calculations could be refined also. *Subject Headings:* **1. Auroral nitrogen bands 2. Auroral spectra 3. Nitrogen in auroras.**—*Author's abstract.* Ⓢ

12.7–187 551.594.51:535.33:546.17

Mastrup, Frithjof, **Experimental determination of the absolute oscillator strengths of the lines of two N II supermultiplets.** *U. S. National Aeronautics and Space Administration, Technical Translation* F-38, May **1960.** 19 p. figs., 11 tables, 15 refs. Transl. of Thesis (Ph.D.)—Christian Albrechts University, Kiel, **1957.** Transl. by Consultants Custom Translations, Inc., N. Y., of original German **Eine experimentelle Bestimmung der absoluten Oszillatorenstärken der Linien zweier N II-Supermultipletts.**—The following work describes the experimental determination of the absolute oscillator strengths of several N II-lines. The light source was the plasma of a wall-stabilized enclosed (cylindrical) arc in pure nitrogen. The parameters of this plasma near the axis of the arc were calculated from the measured total intensity of the hydrogen-like triplet-multiplet of the series 2p3d – 2p4f. It was here assumed that the oscillator strengths of this multiplet can be calculated by the Bates and Damgaard Coulomb field approximation. In addition, an attempt was made to check the measured oscillator strengths of the N II line in the nitrogen plasma by measurements in a helium-nitrogen mixture, using the known oscillator strengths of helium. *Subject Heading:* **1. Auroral nitrogen lines.**—*Author's abstract.*

D5. VAN ALLEN BELTS

See also: **Motion in geomag. field lines** (Loughnan), 12.7–167.

12.7–188 551.507.362.2:551.521.64:551.521.67

Van Allen, James A. and Lin, Wei Ching (*both, State Univ. of Iowa*), **Outer radiation belt and solar proton observations with Explorer VII during March–April 1960.** *Journal of Geophysical Research,* Wash., D. C., 65(9):2998–3003, Sept. 1960. 2 figs., table, 9 refs. **DLC**—Explorer VII included an instrument, prepared by the Department of Physics and Astronomy, State University of Iowa, for a one year study of the lower parts of inner and outer radiation belts, the cosmic ray intensity near the earth, and the arrival of solar protons. Figures exhibit the counting rate data from a series of representative passes. The plot for 1013–1035 of April 1, shows abnormal intensity of relatively penetrating radiation regarded as consisting of solar-emitted protons. The solar proton event of April 1, the most intense of the some ten events observed by Explorer VII, would be classed as one of intermediate intensity compared with events of the International Geophysical Year. The detailed history of the outer radiation during late March and early April contained fluctuations of large magnitude. Some of the passes exhibitied a complex spatial structure of the outer zone during the period of rapid growth. The magnetic storm which began at 0815 UT on March 31 was one of the largest on record. *Subject Headings:* **1. U. S. satellite, 1959 Iota (Explorer VII) 2. Van Allen belts 3. Solar proton radiation.**—*O.T.* Ⓢ

12.7–189 551.507.362.2:551.521

Stuart, G. W. (*General Dynamics Corp., San Diego*), **Satellite-measured radiation.** *Physical Review Letters,* N. Y., 2(10):417–418, May 15, 1959. 10 refs. **DWB, DLC**—Atomic charge exchange processes in relation to the radiation belt are discussed. The salient topic is whether the low energy component of trapped radiation is electronic or the source of protons by far more intense than anticipated. The electron model combined with the solar wind hypothesis provides a mechanism which could raise electron energies from the ev to the kev range. *Subject Headings:* **1. Satellite radiation observations 2. Van Allen belts.**—*W.N.* Ⓢ

E. SOLID EARTH GEOPHYSICS

E1. GEOPHYSICS

See also: **Gassiot Fellowships in Geophysics** (Sutton), 12.7–43.

12.7–190 550.3:551.1/2:551.5

Flohn, Hermann (*German Weather Service, Offenbach/M.*), **Neue Probleme und Erkenntnisse der Physik der Erde.** [New problems and knowledge of the physics of the earth.] *Universitas, Stuttgart* (German ed.), 14(6):603–614, June 1959. **DLC**—The role of theoretical model building in geophysics is discussed and its application in the examination of a number of geophysical problems is considered. The state of present knowledge on the following geophysical problems is reviewed: the hydrological cycle of the Earth; the phenomena of glacier recession; possible cause of climatic fluctuations, such as increase in atmospheric CO_2 content the CO_2 balance of the atmosphere; the electricity balance of the earth and the role of thunderstorm activity as a generator of electricity; the factors involved in the slowing down of the Earth's rotation rate; the nickel iron constitution of the Earth's nucleus; the theory that a self-exciting dynamo in the core of the Earth is the cause of the earth's magnetism; variation in the direction of the earth's magnetic role and of the Earth's rotation axis in the geologi part; and the reassessment of the problems of the migration of the continents on the basis of the slow migration of the rotation axis and shifting of the Earth's crust. *Subject Heading:* **1. Physics of earth.**—*I.L.D.*

12.7–191 551.5:550.3:519.24

McDonald, James E. (*Univ. Arizona*), **Remarks on correlation methods in geophysics.** *Tellus*, Stockholm, 12(2):176–183, May **1960.** 4 tables, 13 refs. **DWB, DLC**—From consideration of several studies of the sampling properties of the product-moment correlation coefficient *r* it is concluded first that undue concern has been expressed for the problem of non-normality in correlation studies in geophysically adequate significance tests and confidence limits for *r* can almost always be achieved through use of the simple standard error of *r*. A growing tendency in climatology and hydrology to employ unnecessarily elaborate methods appears to stem from unrealistic emphasis which mathematical statisticians frequently place upon theoretical refinements, emphasis that loses sight of the limits of accuracy inherent in the very type of data usually subjected to statistical analysis. *Subject Headings:* **1. Geophysical methods 2. Statistical analysis.**—*Author's abstract.*

E2. SEISMOLOGY

See also: **Mechanism of earthquakes** (Bessonova et al.), 12.7–11.

12.7–192 550.342:551.515.33

Kisslinger, Carl (*St. Louis Univ., Missouri*), **Seismograms associated with the near passage of tornadoes.** *Journal of Geophysical Research*, Wash., D. C., 65(2):721–728, Feb. **1960.** 6 figs., 5 refs. **DLC**—The principal features found on seismograms obtained on three occasions when a tornado passed near the station are described. Long periods, 50 sec and greater, predominate, with periods of 30 sec and less and bursts of very short period activity superimposed. The classical solution for a vertical load on an elastic half-space is applied, and the results indicate that elastic tilts due to the static loading effect of the tornado contribute substantially to the basic form of the record. The shorter periods are ascribed to the dynamic loading of the high winds on obstacles in the path. Part of the activity is not ground motion, but is due to the buoyancy effect caused by the rapid pressure fluctuations. *Subject Headings:* **1. Tornado effects 2. Seismograms of tornadoes.**—*Author's abstract.*

12.7–193 550.340.8

Hordejuk, J.; Uchman, J. and Wojtczak, B. (*all, Inst. Geophysics Polish Acad. Sci.*), **A new type short-period seismograph SK-58.** *Acta Geophysica Polonica*, Warsaw, 7(2): 165–175, **1959.** 10 figs., ref. Polish summary p. 173–175. **DWB, DLC**—A paper describing the recently developed short-period seismograph SK-58. Its design is based to a considerable extent on a U.S.S.R. model. Work on the seismograph began in 1955 and, after testing in 1957, the first series of apparatus has been constructed. Completely assembled, the new seismograph consists of two horizontal seismographs, one vertical seismograph and a recording apparatus. Its mechanism and operation are described. Several photographs illustrate the description. *Subject Heading:* **1. Seismographs.**—*I.S.*

E3. GEOCHEMISTRY

12.7–194 550.4:551.588.2

Perel'man, A. I., **Geokhimiia i landshaft.** [Geochemistry and landscape.] *Priroda*, Moscow, No. 3:23–32, March **1960.** 5 figs., color map (fold). **DLC**—B. B. Polynow considers "geochemistry of the landscape" as a science linking geography and geochemistry. The distribution of geochemical landscapes is determined by the climate and the geological structure. In the confines of a climatic subzone the differences of landscapes are mainly caused by peculiarities of the geological structure and topography. It is natural that the migration of chemical elements proceeds differently in various landscapes. Investigations have shown that the more organisms and water that occur in the landscape—the more intensive is the migration of chemical elements in it. Further, the author explains the biological cycle of elements and atoms in the landscape, the hydrologic cycle, etc. He points out the necessity of a detailed geochemical study of landscapes in the future. A schematic colored map of geochemical landscapes of the U.S.S.R. is included. *Subject Headings:* **1. Geochemical landscapes 2. U.S.S.R.**—*A.M.P.*

OCEANOGRAPHY—HYDROLOGY–GLACIOLOGY

F1. OCEANOGRAPHY

See also: **Natural coastal environments** (Putnam et al.), 12.7–19; **Hydrobiol. measurements on Drifting Station Bravo, Arctic** (Apollonio), 12.7–31.

12.7–195 551.465:532.593

Gaillard, P., **Des oscillations non linéaires des eaux portuaires.** [Nonlinear oscillations of harbor waters.] *La Houille Blanche*, Grenoble, 15(2):164–172, March/April **1960.** fig., 13 refs., 35 eqs. French and English summaries p. 164. **DLC**—The author extends the theoretical study of water oscillations in a rectangular basin of constant depth, subjected to the action of a complex swell through an opening in the basin, to the second order of approximation for amplitudes. The second order treatment according to ACHYUT APTE is developed more rigorously. The second order treatment brings out long period oscillations. Using nonlinear effects, it is possible to interpret the creation of seiches, which endanger the stability of moored ships and which in harbors by short but variable period swells coming from the open sea. *Subject Headings:* **1. Coastal currents 2. Water waves 3. Seiches.**—*Author's abstract.*

12.7–196 551.465:532.593

Gohin, François, **Etude des spectres de houle à proximité des côtes.** [Wave spectra in the vicinity of the coast.] *La Houille Blanche*, Grenoble, 15(2):113–121, March/April **1960.** 6 figs., eqs. French and English summaries p. 113. **DLC**—Tukey's method makes it possible to obtain wave energy spectra from a recording of water level changes with time. The energy spectra obtained at a given observation point can be classified in families. All the spectra of any one family have the same shape. In order to be able to forecast wave spectra it is necessary to have studied the relationships between the fundamental parameters of the spectra and of the corresponding meteorological data. When forecasts become sufficiently accurate it will be possible to prepare energy spectra statistics. *Subject Headings:* **1. Coastal currents 2. Wave motion 3. Wave spectra.**—*Author's abstract.*

12.7–197 551.465:532.593

†Miche, Robert, **Sur quelques spectres de houle de la Manche Occidentale: comparaison avec des spectres théoriques.** [Wave spectra in the Western Channel, compared with theoretical spectra.] *France. Comité Central d'Océanographie et d'Etudes des Côtes, Cahiers Océanographiques*, 12(1):13–57, Jan. **1960.** 2 figs., 6 tables, 32 refs., numerous eqs., French summary p. 13. **DLC, DWB**—The report discusses some useful French data on wave spectra over the Western Channel in the Atlantic and the records of the meteorological factors obtained in 1958. Three significant wave spectra having these amplitudes are discussed: 19.98, 25.87 and 14.83. It is concluded that apparently two of these have long components that are greater than one period a minute as the waves approach the shore. The spectra of the third group merely follow wave motion as influenced by meteorological factors and other weather conditions. *Subject Headings:* **1. Wave spectra 2. Western Channel, Atlantic Ocean.**—*N.N.*

12.7–198 551.465:532.5

Goddet, J., **Etude du début d'entraînement des matériaux mobiles sous l'action de la houle. Application à l'étude de la couche limite oscillatoire. Critères de similitude.** [The initial stages of the transport of suspended matter by wave action. Application to the study of the oscillatory boundary layer. Similitude criteria.] *La Houille Blanche*, Grenoble, 15(2):122–135, March/April **1960.** 7 figs., table, 4 refs. French and English summaries. **DLC**—In this paper the author presents an experimental law connecting the density and liameter of suspended matter with wave characteristics when transport begins. He gives a ustification of the above law as provided by a test performed at the Laboratoire National l'Hydraulique on the basis of a few simple hypotheses concerning the existence of a laminar oscillatory boundary layer, and confirmation of the existence of a boundary layer with charac- eristics very similar to those predicted by calculation. Similitude criteria required for simu- ating moveable bed transport conditions under the action of swell with a laminar boundary ayer are investigated. The author then deals with tests that will have to be carried out to extend the similitude laws to turbulent boundary layers and to improve our knowledge of this actor. The results give evidence of the importance of three nondimensional parameters Reynolds number): squall characteristics, boundary layer characteristics and characteristics of the squall position in the boundary layer, parameters intervening only to characterize the low regime (laminar or turbulent) in the vicinity of the squall and the distribution of velocities n the flow. The tests make it possible to determine, at least in the set of the materials used and of the swells achieved, a law giving the initial speed for material transport as a function of apparent density, diameter and period of the swell. *Subject Headings:* **1. Dynamic oceanog- raphy 2. Turbulent motion 3. Sediment transport under wave action.**—*A.V. and author's ibstract.*

12.7–199 551.465:532.593

Goddet, J. and Jaffry, P., **La similitude des transports de sédiments sous l'action simul- anée de la houle et des courants.** [Similitude laws for sediment transport under the simul- aneous action of waves and currents.] *La Houille Blanche*, Grenoble, 15(2):136–147, March/ April **1960.** 6 figs., 2 tables. French and English summaries. **DLC**—The authors consider in urn the action of permanent currents, reviewing similitude laws and their applications, and he action of waves. First they set forth the present state of the problem and the studies performed at the Laboratoire National d'Hydraulique to enable determination of transport hreshold speeds under certain conditions. Dealing afterwards with the simultaneous action of waves and currents, they investigate the compatibility of the respective similitude conditions o enable the predetermination of scale model characteristics. In conclusion, the authors reat of experimental checking. *Subject Headings:* **1. Sea currents 2. Swell 3. Sediment ransport under wave action.**—*A.V. and authors' abstract.*

12.7–200 551.556.8:551.461.2:532.59:533.6.07

Larras, Jean and Claria, Albert, **Recherches sur l'action relative de la houle et du vent.** Research on the relative action of swell and wind.] *Académie des Sciences, Paris, Comptes Rendus*, 250(10):1801–1802, March 7, **1960.** 2 refs. **DWB, DLC**—The distribution of elative wind pressures on the instantaneous but momentarily stark surface of simple cylindrical well is of interest for the mathematical study of the formation and development of swell under he action of the wind. The authors state the results of a preliminary series of experiments nade in a wind tunnel to determine the pressure coefficients on the surface of wave undulation. brief description of the model used and the progress of the experiments are given. These ave proved that the wind pressure on the free surface of the swell may be expressed by the elation

$$p=K\frac{\bar{\omega}}{2g}V_0^2 \qquad \text{where} \qquad K=\left(\frac{V}{V_0}\right)^2, \qquad V_0=\text{speed}$$

t the infinite up-stream, V=speed at the considered place, $\bar{\omega}$=volumetric weight of air. The ests conclude with a nearly symmetric distribution of wind pressures on the free surface and n both sides of the crests although there was an asymmetrical distribution. Furthermore, tronger depressions on the crests than excess of pressures in the troughs were observed. *ubject Headings:* **1. Wind effects on water surfaces 2. Swell 3. Wind pressure distribution Wind tunnel experiments 5. Toulouse, France.**—*A.V.*

12.7–201 551.461.2:532.59:532.66

Takano, K., **Effects d'un obstacle parallélipédique sur la propagation de la houle.** [The ffects of a rectangular obstacle on wave propagation.] *La Houille Blanche*, Grenoble, 15(3): 47–267, May **1960.** 10 refs., eqs. **DLC**—This article is devoted to a theoretical treatment by means of linear approximations of two analytically similar but physically distinct phenomena. Consider an open wave flume with a horizontal bottom. A rectangular obstacle *S*, the top and bottom of which are parallel, and whose width is the same as that of the flume, can disturb two-dimensional wave propagation in two ways: 1) *S* is partially immersed in the liquid. The incident waves are partially reflected by the upstream face of *S*, pass between the lower face of *S* and the bottom of the flume under pressure, and reappear downstream as transmitted waves. 2) *S* is completely submerged. The incident waves pass over the sill formed by *S* and set up a periodic disturbance, which may be very complex, over and downstream of *S*. *Subject Headings:* **1. Swell 2. Wave propagation.**—*Author's abstract.*

12.7–202 551.461.2:525.6

Rattray, Maurice, Jr. (*Univ. Washington, Seattle*), **On the coastal generation of internal tides.** *Tellus*, Stockholm, 12(1):54–62, Feb. **1960.** 4 figs., 9 refs., 58 eqs. **DLC**—Differential equations, boundary, and discontinuity conditions are obtained which relate the internal tide to the surface tide in a two-layer system. Solutions of these equations give internal tides which may be large compared to the surface tide. In the coastal region these internal tides are standing waves and further offshore they attain the characteristics of progressive waves traveling seaward. *Subject Heading:* **1. Ocean tides.**—*Author's abstract.*

12.7–203 551.579.4:551.553.21:551.351.2

Mahadevan, C. and Anjaneyulu, B. J. N. S. R., **Studies on dredged sands off Visakhapatnam Harbour area.** *Andhra Univ., Waltair, India, Memoirs in Oceanography*, 1:51–56, **1954.** 2 figs., 3 tables, 5 refs. **DLC** (GC1.A55)—Preliminary analytical results of representative dredge samples taken Dec. 1951 two miles east northeast of the Visakhapatnam Harbour entrance indicates that the black sand concentrates along the beach between the Dolphin's Nose and Kaibasa is to a large extent caused by a current-cum-wave action, partly also by streams during monsoon floods and by long shore currents. *Subject Headings:* **1. Monsoon floods 2. Sand bars 3. Visakhapatnam, India.**—*W.N.*

12.7–204 612.39:546.17:546.185:593.14:551.464

†Barnes, H. (*Marine Station, Millport, Scotland*), **Nutrient elements.** *Geological Society of America, Memoir*, No. 67, Vol. 1, 297–343, Dec. **1957.** 26 figs., bibliog. p. 338–343. **DLC** (QH542.N3)—Phosphorus, nitrogen, silica pH, etc. in sea water necessary for phytoplanktons are not dependent on salinity. Physical processes such as upwelling, turbulence and eddy diffusion, vertical convection, cascading and capsizing, and site of the decomposition are discussed and illustrated diagramatically. Nutrient elements descending to the bottom through decay or self-propulsion must be returned to the surface by the above or other means. Chemical and biological processes of the nutrient cycle (nitrogen cycle, silicon cycle and phosphorus cycle) are treated in more detail. Curves show average free ammonia, albuminoid nitrogen and organic nitrogen in Pacific waters from 0 to 1500 m depth. Regional and seasonal distribution of nutrients in coastal and inshore waters: seasonal variation of nitrate and nitrite in Gulf of Maine; highest concentration of NH_3-N in upper 80 m of Gulf of Main compared with zooplankton; distribution of phosphate and nitrate in North Sea; NH_3, NO_2 and PO_4 in Gulf of Finland and Baltic, Western North Atlantic, Antarctic, Weddell Sea, Indian Ocean, etc. are discussed at length and shown in graphs and charts. *Subject Headings:* **1. Nutrient elements in sea water 2. Phosphate content of sea water 3. Nitrogen content of sea water 4. Phytoplankton distribution 5. Oceans.**—*M.R.*

12.7–205 551.46.018 551.463:535.34

Ivanoff, A., **Au sujet des perfectionnements apportés à l'étude de la lumière diffusée par des échantillons d'eau de mer, et des résultats ainsi obtenus au large de Monaco.** [About improvements in the study of the light diffused by samples of sea water, and results obtained off Monaco.] *Académie des Sciences, Paris, Comptes Rendus*, 250(4):736–738, Jan. 25, **1960.** fig., 2 photos, 4 refs. **DWB, DLC**—The technique of studying the diffusion and polarizing properties of sea water samples, taken with classical tip-up bottles and then decanted in a diffusometer presents numerous disadvantages: alteration and pollution of the samples by decanting and increase of temperature, formation of vapor, precipitation of suspended particles

c. The new apparatus herein described decreases these disadvantages. It consists of special ass bottles for taking samples and which, after the samples have been taken and without ing opened, are themselves introduced in the measuring apparatus where they are dipped in ater at the ambient temperature to avoid any formation of vapor and brought into a rotary otion about their axis to avoid the precipitation of the suspended particles. Results obtained Monaco and between Monaco and Corsica are given. The surface waters to a depth of 0 m, contain many more particles in suspension; in April and particularly in August, the rate polarization of the diffused light increases to a depth of about 30 to 50 m, which probably rresponds to the presence of a spheroid shaped phytoplankton. A slight increase of the fusion coefficient at about 250 m depth in August, at about 300 m in November and at about 0 m in April was also observed. It is at these depths that Mediterranean waters present ght maximums of salinity and temperature. *Subject Headings.* **1. Oceanographic sounding uipment 2. Sea water samples 3. Light diffusion in sea 4. Monaco.**—*A.V.*

12.7–206 551.46.018:551.462

Isaacs, John D. and Schick, George B. (*both, Scripps Inst. of Oceanog., La Jolla, Calif.*), **eep-sea free instrument vehicle.** *Deep-Sea Research*, London, 7(1):61–67, Aug. **1960.** figs., table, 6 refs. **DWB**—A number of free instrument vehicles have been designed and sted. These are simple, reliable, inexpensive devices that transport recording instruments or npling equipment to the deep-sea bottom, or to intermediate depth, and return them to the rface. Vehicles are provided with radar reflectors and other location devices. In the first sts the vehicles bore fish traps and were successfully operated to 2,000 fathoms. Other struments designed to make use of the free vehicle's unique capabilities are under development. *Subject Headings:* **1. Oceanographic instruments 2. Deep sea soundings.**—*Authors' stract.*

12.7–207 551.46.018:551.461.2

Filloux, Jean (*Scripps Inst. of Oceanog., LaJolla, Calif.*) and Groves, Gordon (*Universidad icional Autónoma de Mexico*), **A seasonal mean sea-level indicator.** *Deep-Sea Research*, ndon, 7(1):52–61, Aug. **1960.** 8 figs., table, 2 refs., 9 eqs. **DWB**—By means of oil capilies the indicator attenuates the tidal rise and fall of the sea surface, as well as all fluctuations higher frequencies. The time constant of the response is chosen so that the smaller, slower ctuation of sea level is transmitted with very little change of amplitude and phase. There no recorder. Visual readings of the oil level in a burette should be tabulated twice a week. stallation of the instrument is much easier and cheaper than a recording tide gauge. *Subject adings:* **1. Sea level indicators 2. Tidal gages.**—*Authors' abstract*

12.7–208 551.46.018:621.863

Beckman, Walter, C.; Drake, Charles L. and Worzel, J. Lamar (*all, Columbia Univ., Y.*), **R/V Vema deep-sea winch.** *Deep-Sea Research*, London, 7(1):48–52, Aug. **1960.** gs., 7 refs. **DWB**—Various types of deep-sea winches have been used aboard oceanographic ssels. Their design has been limited to use of electrically powered drums and winding engines lizing rather elaborate speed regulation and braking devices, and of diesel-driven winches lizing multiratio geared transmissions for hauling and the engine itself for braking. These nches have been able to lower cable at rates of 50–80 fathoms (100–150 m) per minute and noist at rates of 25–40 fathoms (50–75 m) per minute. The recently redesigned heavy trawl nch being used aboard the R. V. VEMA of the Lamont Geological Observatory (Columbia iversity) is described herein. During the lowering operation a Parkersburg Hydrotarder is d for braking. It provides a varying positive braking action function as a water brake ich converts the mechanical energy into heat. For raising, a diesel engine drives the winch ough a torque converter. This permits full utilization of the developed power of the engine, nethod of exerting a fixed tension when pulling the apparatus out of the bottom, and elimies the necessity of shifting gears and engine lugging (running over-loaded at slow speed) as h geared transmissions. With the new equipment, cable lowering speeds of 120 fathoms 0 m) per minute and raising cable speeds of 50–70 fathoms (100–130 m) per minute are sible. *Subject Headings:* **1. Deep sea soundings 2. Winches 3. Oceanographic instrunts.**—*Authors' abstract.*

F2. SEA ICE

See also: **Snow cover on drifting ice, Central Arctic** (Iakovlev), 12.7–30; **Hydrol. conditions, Olaf Prudes Bay** (Kunetskiĭ), 12.7–36; **Freezing of Sea of Azov** (Khesina), 12.7–310.

12.7–209 551.326.

Weeks, Wilford F. (*Wash. Univ., St. Louis*), **The structure of sea ice: a progress report.** *National Research Council, Wash., D. C., Publication*, No. 598:96–99, Dec. **1958.** 6 refs **DLC, DWB** (551.311 A675pr)—It has long been known from the accounts of Polar explorers that the physical characteristics of sea and lake ice were very different. In an attempt t delineate and explain some of these differences, a field study was made during the winters o 1956–57 and 1957–58 of the crystalline structure of the sea ice along the coasts of norther Labrador, Baffin Island and northwest Greenland. This is believed to be the first detaile study of this type ever attempted and this paper presents a few preliminary results. *Subjec Headings:* **1. Sea ice structure 2. Labrador 3. Baffin Island 4. Greenland.**—*I.S.*

12.7–210 551.326.7:539.2

Tabata, Tadashi, **Studies on mechanical properties of sea ice, Pt. 3, Measurement o elastic modulus by the lateral vibration method.** *Low Temperature Science, Ser. A, Physica Sciences*, Sapporo, Japan, No. 18:115–129, **1959.** 4 figs., 8 refs., 8 eqs. In Japanese; Englis summary p. 128–129. **DWB, DLC**—Elastic moduli of 39 samples were measured at variou temperatures between −3°C and −52 °C, and Fig. 1 and 2 show the results obtained fo Young's modulus of mosaic and granular ice temperature (°C). The density of two types o ice and other results of experiments at −10 °C and −30°C, the frequency dependency, th chlorinity, the volume of brine in sea ice of 1°/₀₀ chlorinity are described. Remarkable change of temperature relationships are noticed at −8.2 °C and −23°C, where $Na_2SO_4 \cdot 10H_2O$ an $NaCl \cdot 2H_2O$ are crystalized respectively from brine. Although the elastic modulus of sea ice i dependent upon temperature and density of the ice, experimental values are scattered over wide range due to the various impurities in the ice (Figs. 9 and 10), at a particular temperatur The volume of brine is a linear function of chlorine content; however, temperature dependenc could not be represented as a function of volume of brine or of other elements (Fig. 11). *Subje Headings:* **1. Sea ice mechanical properties 2. Elasticity of sea ice.**—*K.C.*

12.7–211 551.326.7:539.3

Tabata, Tadashi, **Studies on mechanical properties of sea ice, Pt. 4, Measurement internal friction.** *Low Temperature Science, Ser. A, Physical Sciences*, Sapporo, Japan, N 18:130–148, **1959.** 17 figs., 5 eqs., 7 refs. table appended. In Japanese; English summar p. 145–147. **DWB, DLC**—Data on the internal friction of sea ice were obtained by measurin the resonance frequency and damping coefficient of a rectangular ice bar. Then, the equatio for the solution of the lateral vibration with damping is obtained as

$$w^2+\lambda^2=\frac{m^4h^2E}{12e^4\rho}$$

where, w is angular frequency, h is the thickness of bar, e is the length, ρ is the density, E elastic modulus, m is 4.730 for fundamental vibration. Internal friction tan δ is expressed b $2\lambda/w=\tan\delta$ tan δ means the dissipated energy for every one cycle of vibration and is obtaine experimentally (Fig. 4). Comparative experiments have been made to determine the relatio between tan δ of mosaic ice and temperature (Fig. 5), granular ice and temperature (Fig. and between the resonance curve at various temperatures (Fig. 7) and density at −10°C a chlorinity at −10°C (Figs. 8–11). The conclusions obtained are as follows: the temperatu dependency of internal friction is suddenly changed at −8 °C–10 °C and at −22 °C–23 ° similar to the case of elastic modulus of sea ice it is also changed at the temperature at whic $Na_2SO_4 \cdot 10H_2O$ and $NaCl \cdot 2H_2O$ are crystallized. Tan δ of mosaic ice does not depend upon i density and that of sea ice has no distinct relation to its chlorinity or volume of brine. Final the internal viscosity (Figs. 14 and 15), increases with the decrease of temperature for the ran from −3° to −30°C–45 °C and it does not depend upon resonance frequency, but for the ca f granular ice there is no distinct relation between them. *Subject Headings:* **1. Sea ice echanical properties 2. Internal friction measurements 3. Viscosity-salinity-temperature elationships.**—*K.C.*

12.7–212 551.321.6:551.324.28(99)

Thiel, Edward; Behrendt, J. C. et al., **Ice thickness and bottom topography of the Filchner e shelf and along the Ellsworth-Byrd traverse route.** *American Geophysical Union, Trans-ctions*, 40(4):423–426, Dec. **1959.** 3 figs. **DWB, DLC**—The report summarizes the observa-ons of two over-snow traverses during the Antarctic summers 1957–58 and 1958–59. Both arties used seismic, gravity and magnetic techniques for their studies. The 1957–58 Ellsworth averse made three major discoveries: 1) the shelf has a much greater area than previously ipposed, approximately 160,000 sq mi; 2) the shelf is grounded on at least two "islands,") a deep trough extends inland beneath the shelf from the barrier edge of Ellsworth Station. he 1958–59 Ellsworth-Byrd traverse party surveyed a number of prominent peaks in the gion beyond the Filchner Ice Shelf in the vicinity of 88 °W. "The 70 mi wide mountainous ea in the vicinity of 88°S lends further support to the suggestions of THIEL, OSTENSO and ENTLEY (*Bulletin*, No. 25) that a high, mountainous land connection (but mostly buried eneath ice) may exist between the South Pole area and the mountains of Palmer Penin-la . . . ." An air-borne traverse along the 88 °W meridian, planned for the Antarctic immer of 1959–60 should throw further light on whether the hypothetical trans-Antarctic ough really exists. *Subject Headings:* **1. Ice thickness 2. Bottom topography of ice shelves Antarctica. I. Bradley, E. A. II. Turcotte, F. T.**—*M.L.R.*

12.7–213 551.326.7(265.4)

Sawada, T., **On the daily ice-edge displacements of the pack-ice area covered on entire outhern Okhotsk Sea in thawing time, 1956.** *Hakodate, Japan. Marine Observatory, ulletin*, No. 5, [Contribution No. 14], Dec. **1958.** Reprint from unidentified source, p. 117–24. 8 p. figs., table, 3 refs. In Japanese; English summary p. 117. **DWB**—In April 1956, e crab-fishing boats which were going to the fishing grounds west of the Kamchatka Peninsula, ncountered a large hummocked ice field which covered the entire southern Okhotsk Sea and ere obliged to continue a very stormy voyage for 10 days to cross this ice area. In 1957 the ab-fishing factory-ship groups (composed of 4 factory-ships and 12 fishing boats), in spite of a -day delay in departure, were again enclosed for 30 days in a vast pack ice area that surpassed far that of the previous year both in quantity and qualitity in the same area. During this eriod from April 8–May 5, 1957, these ships of the fishing fleet and co-operative patrol ships rried out full investigation of the ice conditions over the entire area. The daily situation at e western ice edge and details in full of the condition of its displacement are described. *ubject Headings:* **1. Ice drift 2. Okhotsk Sea.**—*Author's abstract.*

12.7–214 551.326.7:778.35(265.4)

*Watanabe, Kantaro and Nakayama, Ichizo, **Results of non-vertical aerial photographic rvey of sea-ice in the south-western region of the Okhotsk Sea in Jan.–Apr., 1957.** *Hakodate, ipan. Marine Observatory, Bulletin*, No. 5, [Contribution No. 11], Dec. **1958.** Reprint from identified source, p. 49–77. 7 figs. (incl. photos), 17 charts, table, 4 refs. In Japanese; nglish summary p. 49–50. **DWB**—Aerial observations of sea ice in the southwestern region the Okhotsk Sea were carried out from Jan. 26 to April 10, 1957. And by means of the easy ethod of photographic survey, 16 charts of sea ice distribution have been obtained from about 0 oblique photographs taken from planes at elevations of nearly 6000 ft (Charts 2–17). hough the flights were limited only to the coast line of Hokkaido (*see* Charts 1a, 1b) and the otos were mostly taken by ordinary amateur cameras like miniature type or twin-lens flex-type, the sea ice distribution could be mapped with fairly good accuracy over the range om each photograph station to a distance of 60 to 100 km. On inspecting one by one all the arts and the photos, the following facts are clear: (i) The drift ice in this region was rather en and consisted mostly of ice-cakes until nearly Feb. 21 as presented in the photo in Fig. 3 d Charts 2–7. In the period between about the end of Feb. and the middle of March occurred rapid increase in the amount of ice as shown in Charts 8–12, and simultaneously ice-floes peared in groups of ice-cakes as illustrated in the photo in Fig. 4. Then, at the middle of

March, the closeness of drift-ice reached maximum having hummocked ices everywhere, as shown in the photo in Fig. 5 and Charts 13–15. And finally, the ice-field gradually moved away eastwards from the vicinity of Hokkaido in April (Charts 16–17). (ii) As the prevailing wind of N or NW in this region was anomalously weak in Jan. and Feb. of this winter, the feature of surface current was fairly represented by the distribution pattern of drifting ice. Judging from the Charts 2–8, it may be easily accepted that an end flow of the East Sakhalin current directs nearly to the Notori-Misaki from the eastern vicinity of the Cape of Aniva of Sakhalin, and drift ice flows southward with considerable rate even though wind blows from the south. Also, it is well shown in most charts that the Soya warm current flowing along the Okhotsk Sea coast of Hokkaido (see Figs. 6a, 6b) is very strong. (iii) Hence, the routes of drift ice in this region can be roughly assumed as Fig. 7 in the consideration about the above mentioned features of surface current and winds shown in Table 2. Concerning the effect of prevailing wind on the motion of drift ice, it seems to be reliable that wind from the N or NW accelerates the drifting of ice, that is, when wind strengthens in the direction of N or NW, the drifting ice in this region increases in closeness. It is well shown in Charts 11–14 that the rapid strengthening of N-component of wind accompanied with the increasing of closeness in the period from the end of Feb. to about the middle of March. The more detailed description about the above stated problems will be reported after the analysis has been completed. *Subject Headings:* **1. Aerial photographic surveys 2. Sea ice distribution 3. Ice drift data 4. Okhotsk Sea.**—*Authors' abstract.*

12.7–215 551.326.7

Sawada, Teruo, **Sea-ice condition on the basis of coastal observations in 1957.** *Hakodate, Japan. Marine Observatory, Bulletin* No. 5. [Contribution No. 12], Dec. **1958.** Reprint from unidentified source, p. 79–89. 11 p. 5 figs., 6 tables. In Japanese; English summary p. 79. **DWB**—This paper summarized sea ice conditions in 1957 mainly on the basis of data from 8 coastal weather stations of Hokkaido, and also consulted with results of the observation by each maritime safety stations and light-houses. On shore-ice, at first, the first and last dates, number of days and period of its freezing at each stations are shown in Table 1. Table 2—Monthly conditions are divided into form, average thickness and blocking days in harbor of fishery boats, etc. Table 3 and Table 4 are inserted the data on drift-ice using similar formality with Table 1 and Table 2. Fig. 2—Distribution of the daily ice-amounts at each station. On total ice-amount of drift-ice, monthly total amounts of typical 3 stations (Soya, Abashiri, Nossappu) and the comparisons with normal and previous year are shown in Table 5 and Fig. 4. On sea-ice, at last, number of days classification according to ice-amount are shown in Figs. 4a–4d. As the damage brought about by sea ice, the ships and occurrence spots of wreckages brought by drift-ice shown in Table 6 and Fig. 5. *Subject Headings:* **1. Sea ice data 2. Ice drift data 3. Ice conditions 4. Coast of Hokkaido, Japan.**—*Author's abstract.*

12.7–216 551.326.7:656.1(98) 551.322:536:539

†Savel'ev, B. A., **Izuchenie l'dov v raĭone dreĭfa stantsii SP-4 v period taianiia i razrusheniia ikh v 1955 g.** [Study of ice in the region of the drift of North Pole-4 Station during its thawing and destruction in 1955.] *Problemy Severa,* Moscow, No. 2:47–79, **1958.** 9 figs., 4 tables, 22 refs., 11 eqs. **DLC**—The program of the study of sea ice used for different purposes (roads, air fields, ice construction, etc.) is briefly described. The study also deals with: thermal and physical properties of ice (conductivity, phase transformation, recrystallization, thawing, formation, etc.), effects of physical phenomena on ice properties, on genetic symptoms for ice formation and thawing processes. Research methods and apparatus are described with reference to the different investigators and explorers who used them. The apparatus includes nickel thermometers, polarization microscopes, calorimeters, thermo-transitometers, micro photographic equipment with polarized and conoscopic lights, etc. Topics of the structural studies include crystallographic orientation on 5 stereograms of the ice of various age taken from different sea depths. Phase and salt compositions (salinity) of ice are discussed with tabulated data for 13 types of ice. Thermal characteristics of ice in the region of North Pole-4 Station are analytically formulated and computed with observed data. Attention is also given to different strengths of surface ice layers around the station. *Subject Headings:* **1. Sea ice melting 2. Ice research 3. Ice drift stations.**—*N.P.S.*

12.7–217 551.501.9(98) 551.5:550.3(98)
Sychev, K., **Zametki gidrologa.** [Notes of a hydrologist.] Moscow, Izd-vo Glavsev-
orputi, **1940.** 27 p. 9 figs. (*Biblioteka "Stakhanovtsy Arktiki,"* [No. 21]) At head of title:
olitupravlenie Glavsevmorputi. **DLC** (QC994.8.S9)—A popular pamphlet describing the
ork of the Yugorsky Shar Polar Station in the Soviet Arctic and the ice forecasting and
eanographic work there. Ice depth measurements, airplane reconnaissance, tidal observa-
ons in summer and winter, and ice conditions in 1936–1938 are described and nicely illustrated.
ıbject Headings: **1. Arctic observatories 2. Ice research 3. Oceanographic research**
Yugorsky Shar, Soviet Arctic.—*M.R.*

12.7–218 551.326.6(99)
Lebedev, V. L., **Klassifikatsiia antarkticheskikh aĭsbergov.** [Classification of Antarctic
ebergs.] *Problemy Severa,* Moscow, No. 2:80–90, **1958.** 2 figs., 29 refs. **DLC**—The origin
Antarctic and Arctic icebergs is slightly different, therefore specific characteristics, observed
ring 1953–1955, are described for the purpose of classification. Antarctic icebergs have
portant effects on the nature and many geographic processes of the region: 1) hydrological
d climatic conditions of ocean are affected by the formation and disintegration of the icebergs;
their thawing produces a large amount of fresh water and minerals; 3) ship navigation is
rgely affected by the icebergs. The icebergs of the land origin are briefly described (glacier,
ble, shelf and other types) with colors and other physical characteristics. Various existing
assifications (ZUBOV, NOVOSIL'SKY, SMITH and others) are discussed with details given in
any references. The classification adopted by the U.S.S.R. is based on: I. origin (snow or
tached, nevé, glacier, black and white, dark green monolythic); II. form (iceberg, field, tables,
othed, hilly inclined rounded, destroyed) and III. grouped icebergs (clustered, town type or
towns). *Subject Headings:* **1. Antarctic icebergs 2. Glacier classification.**—*N.P.S.*

12.7–219 551.326.7:656
Thomas, Charles W. (*Consultant on Ice Navigation, Wash., D. C.*), **The economics of**
rface transportation in sea ice. *National Research Council, Wash., D. C., Publication,*
. 598:267–269, Dec. **1958.** 2 tables. **DLC, DWB** (551.311 A675pr)—A study of the costs
surface transportation in sea ice. The two questions this paper attempts to answer are:
ould the government continue its current policy of using conventional classes of ships in sea
with icebreaker escort? Should we use ice working vessels under charter? The discussion
based on the available cost data for the Antarctic. However, it is applicable to conditions
the Arctic also. *Subject Headings:* **1. Sea ice transportation 2. Antarctica 3. Arctic.**—*I.S.*

F3. HYDROLOGY

12.7–220 551.579.4:551.453(794,793)
†Kesseli, John E. and Beaty, Chester B. (*both, Dept. of Geog., Univ. of Calif.*), **Desert flood**
nditions in the White Mountains of California and Nevada. *U. S. Quartermaster Research*
d Engineering Center. Environmental Protection Research Div., Technical Report EP-108,
ril **1959.** 107 p. 45 figs., 5 tables, 24 refs., map (fold.) **DWB** (M86.U585t)—An exten-
ely illustrated field study reporting the flood conditions in the White Mountains during
y 1956 to Dec. 1957. The physiographic characteristics influencing the flooding of a
ert stream are discussed. The relationship of rain to flooding in desert regions was in-
stigated. An examination of historical records since 1872 indicates that nearly three-
rths of the floods in and adjacent to the White Mountains occurred during summer and were
result of thunderstorms. Floods resulting from prolonged frontal rains on a snow cover in
nter are less frequent. The least frequent is snowmelt flooding which occurs in late spring
early summer. *Subject Headings:* **1. Desert floods 2. White Mountains.**—*I.S.*

12.7–221 551.579.4(771)
*Kaser, Paul, **Meteorology of floods in Ohio Jan.–Feb. 1959.** Columbus, Ohio, Dept. of
tural Resources, Div. of Water, Nov. **1959.** 55 p. 20 figs. (12 fold.), 8 tables (2 fold),
efs. "This is a third report on flood causation as authorized by the 103rd General Assembly."
VB—This report outlines the storm pattern which caused the unusual events resulting in

disastrous floods in Ohio in Jan.–Feb. 1959. It contains the data on snow accumulation, rainfall quantity and intensity over the river basins of the state, and summarizes the quantities of water available for runoff in each basin. The synoptic meteorological conditions associated with two flood storms are described briefly. A discussion of the situation preceding the storm in January is included. Precipitation and low temperatures in this period produced snow and frozen ground which were to become significant factors of the flood. *Subject Headings:* **1. Floods, Ohio** (1959) **2. Precipitation data 3. Snow accumulation 4. Ohio.**—*E.Z.S.*

12.7–222 **551.579.4**(771)

*Ohio. Dept. of Natural Resources. Div. of Water, **Preliminary report of floods in Ohio, Jan. 1959, Feb. 1959.** Columbus, Ohio, March 1, 1959. 125 p. numerous photos. 18 figs., map (fold.), rables. **DWB** (M79.4 037pr)—Ohio suffered from widespread and intense flooding during Jan. 21–24, 1959. On a few streams the stages and discharges exceeded those of 1913. The floods were caused by excessive rain that fell on frozen ground. Previous rainfall and melted snow greatly added to the volume of water in some watersheds. All the available data on precipitation are given, and maps showing the different areas affected are included *Subject Headings:* **1. Floods, Ohio** (1959) **2. Ohio.**—*N.N.*

12.7–223 **551.509.31**:**551.579.4**(282.243.7)

Kletter, Leopold (*Vienna*), **Die meteorologischen Ursachen der Hochwasserereignisse im Sommer 1959.** [Meteorological causes of floods in summer 1959.] *Wetter und Leben*, Vienna 12(3/4):53–62, **1960.** 2 figs., 3 tables. German and English summaries p. 53. **DLC**—Floods on the Danube River and its tributaries occurred in Austria several times during the summer 1959 on account of special weather conditions. It could be shown in the three cases investigated that heavy rain was the result of a synoptic weather situation which developed in four typical stages. *Subject Headings:* **1. Floods, Danube** (1959) **2. Synoptic conditions for floods 3. Danube River, Austria.**—*Author's abstract.*

12.7–224 **551.501.4**:**551.573**:627.

*Demiańczuk, Piotr Pawel (*PIHM, Warsaw*), **Wzór na obliczanie wielkosci parowania powierzchni zbiornika w Kempton Park** (**pod Londynem**) **oraz uwagi o metodzie C. W. Thornthwaite'a.** [Formula for obtaining evaporation amount from the surface of a reservoir in Kempton Park near London, and remarks on C. W. Thornthwaite's method.] *Przeglą Geofizyczny*, Warsaw, 4(3/4):207–217, **1959.** 7 tables, 2 refs., 20 eqs. French summary p. 217. **DWB, DLC**—The author presents a new formula for calculating the amount of evaporation from a reservoir:

$$P_m = S_m \cdot V_m (E_{w,m} - e_m)$$

With this formula he calculated the amount evaporated from the surface of a reservoir a Kempton Park near London. These calculations agree with actual measurements. C. W THRONTHWAITE'S method of calculating evaporation is discussed. In addition to a fu mathematical treatment, evaporation data are tabulated. *Subject Headings:* **1. Evaporation formulas 2. Evaporation data 3. Evaporation from reservoirs 4. Thornthwaite's metho 5. London, Eng.**—*E.Z.S.*

12.7–225 551.501:551.573 551.508.7

Uehara, M. (*Faculty of Agr., Kagawa Univ.*), **On a large-sized recording evaporimeter for use on water surface.** *Journal of Agricultural Meteorology*, Tokyo, 14(1):19–21, July 1958 2 figs., graph, 2 eqs. In Japanese; English summary p. 21. **DWB**—It is most important t investigate the loss by evaporation from reservoirs for irrigation or for generating electricity especially in arid regions. Recently there has been a tendency to use large sized evaporimeter in most countries to observe the amount of evaporation a lowering of the surface of wate caused by evaporation is observed directly with hook-gages, or indirectly with self-recorders The author has recently constructed a device base on the view point that it is desirable t measure the volume or weight of water decreased by evaporation to learn the correct amoun of evaporation. This device is shown in Fig. 1. The principle is based on the idea to turn th riation of the volume of water decreased by evaporation into the variation of water-level in other small water tank, and to make the instrument continually register it. *A* is a water nk, *B* an evaporation tank, and *C* a recorder. They all float together on the water surface. certain amount of water is put into *A* and a certain amount of water is always sent to *B* by water wheel. In case a part of water in *B* evaporates, the rest returns to *A* and the water vel in *A* drops gradually, as long as evaporation continues in *B*. The instrument is made to gister the drop in the water level. Thus meters of any magnification can be made according the proportion of the diameter of the tanks *A* and *B*. The author has made a meter of -fold magnification. *G* is an apparatus to prevent an evaporation curve from being dis-acted on a windy day. *Subject Headings.* **1. Evaporation measurement techniques Evaporimeters 3. Japan.**—*Author's abstract.*

12.7–226 551.579:634.94:582.475(762)

Ursic, S. J. and Thames, J. L. (*both, Southern Forest Exp. Station, Oxford, Miss.*), **Effect cover types and soils on runoff in Northern Mississippi.** *Journal of Geophysical Research,* ash., D. C. 65(2):663–667, Feb. **1960.** 3 figs., table, 5 refs. **DLC**—Hydrologic and meteoro-gical data for individual storms were collected from small headwater catchments representing ree types of cover in northern Mississippi during 1958. Surface runoff and peak flows were eatest from abandoned fields, intermediate from depleted upland hardwood forests, and least om 20-year-old loblolly pine plantations that had been established on eroding farm land. e pine cover has been a highly effective flood-abatement measure. The soils are slit loams of essial origin and Coastal Plain sandy loams. Surface runoff from each of the three types of ver increased directly with the proportion of loessial soil. A shallow fragipan more than ubled the amount of surface runoff and increased peak flows. Detention storage above the gipan was directly related to flow stage at the flume. *Subject Headings:* **1. Runoff 2. Cover ects on runoff 3. Mississippi.**—*Author's abstract.*

12.7–227 551.579:551.48(517.3)

*Kuznetsov, N. T., **Gidrografiia rek Mongol'skoĭ narodnoĭ respubliki.** [Hydrography of e rivers of Mongolia.] Moscow, Akademiia Nau, SSSR, Institut Geografii, **1959.** 149 p. tables, 15 refs.—The book is a revision of an earlier work entitled **Basic regularities in nditions of rivers of the Mongolian People's Republic.** The present edition contains detailed scription of the topography and hydrogeography of over 250 rivers, lakes and their branches. e basic data is obtained from the works of V. A. OBRUCHEV, V. V. SAPOZHNIKOV, E. M. URZAEV and others, which were supplemented by material collected by the author during e Mongolian Agriculture Expedition in 1949–51. Special attention was given to the river sin of Central Asia in view of limited and contradictory early information. The description ntains the basic information on the hydrography of the rivers connected with the North ctic and Pacific Oceans and also of the inner basins of Central Asia not connected with eans, but spreading approximately over ¾ territory of Mongolia. Rain contributes about -65% of the yearly volume of rivers and the balance comes from underground water and w melt. Ground water prevents the thick freezing of Mongolian rivers in spite of severe nters. The characteristics of all major rivers and even small river branches are described h detail and tabulated data as to: chemical composition, variation of levels, time of freezing l opening, thickness of ice cover, rates of water flow, etc. are included. The characteristics o include the description of shore vegetation, geology and shape of river bed types of initial ter source. In spite of the scattered distribution of a great number of small rivers, they resent the basic water supply for the population. Because of weak mineralization of water, ers are suitable for irrigation and because of small salt content they are suitable for technical . A high water level gradient in many large rivers makes them suitable for future hydro-ctric power developments, but due to nonuniform annual water runoff the construction of ervoirs for stabilization of flow would be advisable. The main difficulties in the use of the ers for power development are their freezing and the movement of floating ice and sludge to plant entrance. Good descriptions of the geography of the rivers are given but the absence eneral and local maps is very noticeable. *Subject Headings:* **1. River hydrology 2. Hydrog-hy 3. Mongolian People's Republic.**—*N.P.S.*

12.7–228 551.579:621.311.24:061.

Somov, N. V., **Pervoe nauchno-tekhnicheskoe soveshchanie po gidrometeorologicheskom obsluzhivaniiu stroitel'stva i ekspluatatsii gidroelektrostantsiĭ.** [The first scientific tech nical conference on hydrometeorological service of building and exploitation of hydro electric power stations.] *Meteorologiia i Gidrologiia*, Moscow, No. 4:61–62, April **1960** **DWB, DLC**—This conference was held in Leningrad during Dec. 1959 under the auspices of th Central Administration of the Hydrometeorological Service, Central Administration of Scien tific Technical Society of the Power Industry, etc. Papers were delivered on the all-unio plans of "Hydroelectricity Planning" and effectiveness of hydrological forecasts, etc. A genera evaluation of the services of the hydrometeorological service to the power industry was pre sented. Present methods of hydrological forecasts are not accurate enough to satisfy the need of hydroelectric stations; during the past 5 years the forecasts of water inflow into the reservoi of the Volga-Kama hydroelectric station had a low verification. There is need for a mor reliable methodological base for forecasting annual and semi-annual influx of water into larg reservoirs. The problems of the ice temperature regime in the lower reaches of hydroelectri nets have not been adequally investigated, etc. *Subject Headings:* **1. Hydrologic service 2. Hydroelectric power stations.**—*I.L.D.*

F4. GLACIOLOGY

See also: **Report of Australian glaciologist, F. Loewe** (Kotlaiakov), 12.7–37; **Met. of glacier slope of East Antarctica** (Gusev, Rusin), 12.7–423.

12.7–229 551.506.22:551.324.4(98

Svatkov, N. M., **Ledniki Novoĭ Zemli.** [The glaciers of Novaya Zemlya.] *Prirod* Moscow, No. 3:96–100, March **1960.** 5 figs. **DLC**—The various studies on the glaciers Novaya Zemlya since the first investigations carried out in 1907 by V. A. RUSANOV are re viewed. These include an examination of the extent, maintenance and movement of th Shokalskiĭ Glacier at Russkaya Gavan and temperature and precipitation regime in th region of Russkaya Gavan. A detailed account is given of the glaciological studies carried ou by the Novaya Zemlya Glaciological Expedition during 1957–1959 in connection with the IG program. Repeated journeys on the Shokalskiĭ Glacier have shown that between Bar' Somnenii and the ice divide there exist two sharp inclines on the surface 7–8 km and 14–15 k on a straight line from Bar'er Somnenii. The first one, the Iablonskii Bar'er (with a relativ height of 50 to 70–80 m) closes up in the south an extensive ice filled depression. The glaci surface between the Bar'er Somneniĭ and the Iablonskiĭ Bar'er consists of ridges extendin chiefly in a meridional direction. The second surface elevation of the glacier, which is co siderably more inclined than the Iablonskiĭ Bar'er, is also dissected by crevasses and is cover with snow. At elevations above 570 m this glacier is nourished by snow. The thickness layers of snow surplus increase rapidly with approach to the glacial divide where a hole 25 deep disclosed a 16 m layer of firn with strata of milk white ice and strata containing a bubbles. At the front the ice moved in winter more slowly than in spring and summer. A the station Ledorazdel'naia moist horizons were observed at depths of 8 and 18 m in Novemb 1957. A temperature of 0°C was maintained at a depth of 8 m until February and at 15 until May. At Bar'er Somneniĭ negative temperatures were maintained at depths of 20 and increased slowly to 0°C with depths of the order of 55–60 m. In spite of the long peri frozen state of the uppermost horizons of the lithosphere, frost does not penetrate to gre depths at least along the western shores of Novaya Zemlya. *Subject Headings:* **1. Glaciologic expeditions 2. Glaciers of Novaya Zemlya 3. IGY glaciological program 4. Novaya Zemly Archangel Region, U.S.S.R.**—*I.L.D.*

12.7–230 551.324.

Renaud, André, **Sur la présence et le rôle des impuretés dans les glaciers.** [Presen and role of impurities in glaciers.] (In: I.U.G.G. Association of Scientific Hydrology, **Sym posium de Chamonix, Sept. 1958,** pub. Genbrugge, **1958.** p. 241–243.) **DWB** (551.3 I611sy)—The significance of rock, organic, saline, and gaseous inclusions, and isotopes in is discussed briefly. Rock fragments in ice give information on the origin, sedimentati past climate, and deformation of present glaciers, and may be used in the interpretation of ynamics. Inclusions of organic matter may be used for dating the ice and firn with C^{14}. he role of saline impurities is of little importance in glacier mechanics, but the radioactive otopes among them allow dating of the ice and determination of its deformations and me- ıanics. Tritium permits the dating of firn to about 100 yr, and the ratio of O^{18} and O^{16} may erve as a seasonal criterion for determining individual firn strata independent of their structural ıaracteristics. Ice types may be characterized by occluded gases, and the composition of ıese gases as compared to that of standard air may serve as a basis for new studies in glacier echanics. *Subject Headings.* **1. Glacier mechanics 2. Impurities in glaciers.**—*SIPRE.*

12.7–231 551.324.81:551.324.5:551.324.22(481)

Grove, Jean M. (*Girton College, Cambridge*), **Some structures associated with rotational ow in compound and composite cirque glaciers.** (In: I.U.G.G. Association of Scientific ydrology, **Symposium de Chamonix, Sept. 1958,** pub. Gentbrugge, **1958.** p. 306–312. figs., 8 refs.) **DWB** (511.311 I611sy)—The structures which reflect the flow patterns of etreating cirque glaciers with irregular firn fields in the Jotunheim (Norway) are described detail and compared to those of Vesi-Skautbreen (SIP3874). Three types of glaciers were stinguished: simple cirque glaciers consisting of one ice mass having a pattern of tilt changing om outward to inward near the firn line; compound cirque glaciers consisting of 2 or more ctors with this structure and a simple continuous firn field; and composite cirque glaciers aving 2 or more sectors, which may themselves be compound, and discontinuous firn field.s ilted ice structures and rotational movements were typical of all cirque glaciers studied. The evelopment of the tilted structures is attributable to the fact that the component of velocity ormal to a layer is greater at depth than at the surface. The direction of dip is therefore eversed from outward to inward near the head and general tilt increases into the tongue region. he tilt decreases near the terminus because velocity becomes greater at the surface than at epth and the basal portions of the layers, retarded by basal friction, outcrop. *Subject Heading:* **Glacial structure.**—*SIPRE.*

12.7–232 551.322:535.3

Ambach, Walter, **Beiträge zur Bestimmung des Extinktionskoeffizienten von Gletschereis.** Determination of the extinction coefficient of glacier ice.] *Germany. Deutscher Wetterdienst, erichte,* 8(54):270–272, 1959. 7 figs., 4 refs. German and English summaries p. 270. **DWB, LC**—We report measurements of the extinction coefficient of glacier ice made since 1955 on e "Hintereisferner" (Ötztaler Alps). In particular measurements on the top surface layer hich are of great interest because they show that the radiation penetrates deeply into the acier rather than being absorbed close to the surface. The law of absorption is also found. wo measuring methods were used. The extinction coefficient was measured by means of a ıoto cell on ice samples, also, direct measurements were made by means of a spherical radiation ceiver. The spherical radiation receiver gives plausible results. Further the measurements the ice samples are advantageous for studies of the scattering of the radiation on air bubbles d domain borders. *Subject Heading:* **1. Extinction coefficient of glacier ice.**—*Author's stract.*

12.7–233 551.583.3:551.324.63(234.3)

Finsterwalder, Richard (*Technische Hochschule, Munich*), **Chamonix glaciers.** *Journal of aciology,* London, 3(26):547–548, Oct. **1959. DWB, DLC**—A letter reporting briefly on me of the important theoretical and practical papers read on the physics of ice movement a Symposium held at Chamonix 16 to 25th Sept. 1958. Chamonix being close to the Mont anc glacier group, terrestrial photogrammetric and field studies were made there and the sults compared with the excellent Cart du Mont Blanc 1:10,000, dated 1952. It was noted at Glacier des Bossons has advanced and that Mer de Glace is still retreating. The difference their rate and direction of movement was discussed. The author notes that Mer de Glace oves more slowly perhaps because it does so on a longer and more gentle slope, but weather fluences may be significant causal factors. The author raises the question as to how climatic anges influence glaciers and also how climatic fluctuations and changes can be recognized calculated from the behavior of glaciers. *Subject Headings:* **1. Glacier retreat 2. Climatic fluences on glaciers 3. Chamonix glaciers 4. France.**—*E.Z.S.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION (551.501)

See also: **Weather reconnaissance obs.**, 12.7–17; **Monitoring for air-borne radioactive materials, Hanford** (Soldat), 12.7–104; **Temp. measurements on high speed missiles** (Reis), 12.7–127; **Earth's main magnetic field** (Conley), 12.7–165; **Formula for obtaining evaporation amount** (Demiańczuk), 12.7–224; **Large-sized recording evaporimeter** (Uehara), 12.7–225; **Ascension rate of radiosonde balloons** (Plantier, Magniez), 12.7–273; **Air-borne cloud drop size distribution meter** (Keily, Millen), 12.7–290; **Calculation of frigorigraph temps.** (King), 12.7–302; **A method to make standard CO_2 samples for infrared gas analysis** (Fonselius, Wärme), 12.7–311; **Method of determining circulation at 500 mb level, N. Hemisphere** (Bayer), 12.7–336; **Singularities in annual variations of atmos. phenomena, Spain** (Linés Escardó), 12.7–445.

12.7–234 551.501:551.577.38

Koshelenko, I. V., **Novyĭ podkhod k izucheniiu zasushlivykh i nekotorykh drugikh iavleniĭ.** [New approach to the study of drought and some other phenomena.] *Kiev, Ukraine. Nauchno-Issledovatelskiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 17: 16–30, 1959. 7figs., table, 12 refs., 21 eqs. **DWB**—The author presents a new approach to the study of drought as a meteorological phenomenon manifested as an injurious effect upon plants and attempts to select more objective and universal criteria for its determination. A method is developed for determining evaporation from a water surface and from moist soil on the basis of Dalton's Law (evaporation is directly proportional to the moisture deficit calculated from the temperature of the evaporating surface) and the theory of turbulence. The formula derived is $W=0.24\times10^5(1+0.12\Delta\theta)d[1+3\Phi(u/3)]$ where W=evaporation in g/cm² sec, $\Delta\theta$=temperature difference between specified heights, $d=E_1-e$, $\Phi(u)=\frac{2}{\sqrt{\pi}}\int_0^u e^{-(u^2/z)}du$, u=wind velocity. The formula is compared with that of BUDYKO and is shown to be superior to the latter. The formula for expressing drought is derived from the previous equation, namely,

$$W_1=0.24\cdot10^{-5}(1+0.12\Delta\theta)d\left[1+\phi\frac{(u/3)}{z}\right].$$

The degree of injury of grain crops by drought as a function of duration of sukhovei wind o varying intensity is given by the equation $d=0.28\ Wt$ where W=drought criterion or sukhove criterion, t=time in days. The application of the formula to determination of ripening o field crops, of hay drying, etc. is illustrated with the aid of formulas derived from those above *Subject Headings:* **1. Drought estimation 2. Evaporation from water surfaces 3. Evaporatio from soil 4. Evaporation formulas.**—*I.L.D.*

12.7–235 551.501.7:551.508:533.

Nepomniashchiĭ, S. I., **Nekotorye resul'taty aerodinamicheskikh issledovaniĭ shakh aerologicheskikh priborov.** [Results of aerodynamic investigations of aerological instrumen tubes.] *Leningrad. Nauchno-Issledovatel'skiĭ Institut Gidrometeorologicheskogo Priborostro niia, Trudy*, No. 7:80–84, 1959. 3 figs. **DWB**—In view of the importance of tubes fo protecting aerological instruments for vertical atmospheric soundings, the author carried ou aerodynamic investigations on models of different types of tubes, namely: cylindrical tube Venturi tubes, tubes of special configuration and tubes with a grill for use in aircraft meteor graphs. The experimental procedure is described; the various tubes and the measured a speeds are illustrated with diagrams and the results of measurements on wind velocity with the tubes are presented. *Subject Headings:* **1. Aerological instrument protection 2. Aer dynamic investigations.**—*I.L.D.*

12.7–236 551.501.75:551.507.352:551.557

Endlich, R. M. and Rados, R. M., **The meteorological measurements and field program Project Jet Stream from 1956 to 1958.** *U. S. Air Force. Cambridge Research Center, Ge physical Research Papers*, No. 64, Oct. 1959. 127 p. 20 figs., 36 maps, 13 refs., 3 eqs. **DW**

LC—During the course of "Project Jet Stream," a number of meteorological research flights ere made at altitudes from 25,000 to 40,000 ft in a B-47 aircraft equipped with special instruents for measuring winds, temperatures, pressure, turbulence, etc. The measurements from 6 flights conducted from Wright-Patterson AFB, during 1956–1957 have been processed for se in research efforts. These data pertain to several operational problems of aircraft and issiles and to many fundamental meteorological questions; therefore, they are being made enerally available for study. To use the data intelligently, some familiarity with the measurg instruments and with the conduct of the field program is required. This paper is intended o supply this background. Methods of data reduction and the final forms in which the data re presented are also described. *Subject Headings:* **1. Jet streams 2. Project Jet Stream . Turbulence 4. North America.**—*Authors' abstract.*

12.7–237 551.501.75:551.508.29:551.510.53

Epstein, Edward S., **An empirical study of vertical velocities in the lower stratosphere.** *onthly Weather Review*, Wash., D. C., 87(3):91–96, March **1959.** 7 figs., table, 4 refs., 7 eqs. **LC**—Vertical velocities have been computed for the lower stratosphere for two independent inter periods, by employing a form of the adiabatic method. The regions studied were in oth cases outside the polar vortex. The flow pattern was divided into stationary (long wave) nd transient (short wave) components. The vertical velocity pattern associated with the tationary long wave is precisely that described by KOCHANSKI; i.e., the air rises in moving rom warm troughs to cold ridges. The pattern associated with the short waves is more omplicated. There is a maximum of warm advection in the vicinity of short wave ridges, and old advection near troughs. Local temp. changes, however, very nearly compensate the dvection, with the net result that in the mean the vertical velocities associated with short ave patterns are small, but tend to be positive near ridges and negative near troughs. Supermposition of the short and long wave, however, can lead to any conceivable combination of igns of advection, local temp. change, vertical velocity, and composition with respect to ridge r trough. The single parameter which is most useful in specifying the vertical velocity is the emp. advection. *Subject Headings:* **1. Vertical velocities in the lower stratosphere 2. Temerature advection.**—*Author's abstract.*

12.7–238 551.501.75:551.551.5:551.507.352

Ivanovskiĭ, A. I. and Chermisin, F. G., **O vozmozhnosti priblizhennogo opredeleniia pektra atmosfernoĭ turbulentnostĭ po dannym samoletnogo zondirovaniia.** [Possibility of an pproximate determination of the atmospheric turbulence spectrum from airplane sounding ata.] *Moscow. Tsentral'naia Aerologicheskaia Observatoriia, Trudy*, No. 31:18–21, **1959.** refs., 12 eqs. **DLC**—Vertical vibration of the aeroplane during horizontal flight in the urbulent atmosphere is mathematically formulated on the basis of the work of A. S. DUBOV nd in reference to vertical gust velocity (pulsation)(Wz), vertical overloading (acceleration /sec^2) and coefficient (b) related to the aeroplane construction. The members of this equation ere subjected to substitution with new factors related to friction, acceleration (observed by ccelerometer in the center of gravity of the aeroplane) and to the characteristics of turbulence. The final expression for the component of the correlational tensor of the turbulent velocity of ir particles is obtained with above mentioned mathematical formulas. The uniformity and sotropy of the large scale turbulence is not well expressed by new equation. However, with urther modifications the correlational function and with introduction of the factor of spectral ensity of the energy turbulent pulsations (P_w), it was possible to solve the problem of determination of the spectral composition of the turbulence with observed value of acceleration. *Subject Headings:* **1. Turbulence effects on air craft 2. Airplane soundings 3. Turbulence pectra.**—*N.P.S.*

12.7–239 551.501.75:551.551.5:629.135.2

*Khachatrian, S. P., **Opredelenie vertikal'nikh dvizheniĭ atmosfery po zapisiam akselerorafa, ustanovlennogo na skorostynkh samoletakh.** [Determination of vertical atmospheric ovements from records of an accelerograph installed in high-speed aircraft.] *Moscow. Tsentral'naia Aerologicheskaia Observatoriia, Trudy*, No. 31:22–37, **1959.** 3 figs., 5 tables, refs., 20 eqs. **DLC**—The determination of turbulence in the atmosphere is an important meteorological problem, especially with development of the reaction (jet) power and high gust velocity producing air bumps. In the theory of dynamic stability of the aircraft, its vibration is associated with the turbulent motion of atmosphere. The turbulences are defined by vibration of the aircraft. The author reviewed and analyzed various methods and formulas for determining the vertical velocity of air flow in the atmosphere by magnitudes of over-loading of the aircraft. The relations between the vertical atmospheric movements and acceleration of the aircraft in different parts of the spectrum were computed with different formulas for the four aircraft (Tu-104, two small jets and one IL-12). The results of the computations were tabulated, graphically illustrated in 10 charts and compared on the basis of simplicity and accuracy of different formulas. *Subject Headings:* **1. Turbulence due to aircraft 2. Turbulence effects on aircrafts.**—*N.P.S.*

12.7–240 **551.501.75:551.558.29:551.510.53**

Orlova, E. M., **Rezul'taty rascheta vertikal'nykh skorosteĭ v verkhneĭ troposfere i nizhneĭ stratosfere.** [Results of the calculation of vertical velocities in the upper troposphere and lower stratosphere.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 70:87–103, **1958.** 2 figs., 5 tables, 4 refs., 9 eqs. **DWB, DLC**—Four methods of computating the vertical velocities at levels from 850 to 100 mb are mathematically described. One method is based on computating the divergency of velocity on wind data. Two other methods are based on computating the divergency of velocity with equation for turbulent velocity and on the data for pressure and geopotential fields. In the last adiabatic method the vertical velocity is determined with the data for temperature and pressure fields based on the meteorological observations. In this method two vertical temperature gradients are considered: dry adiabatic and wet adiabatic related precipitation and other weather characteristics. Specific character of vertical velocities, computed with data for pressure and geopotential fields and wind field in the upper troposphere and lower stratosphere are analyzed with mathematical equations and the results are tabulated and illustrated on 2 charts to compare different methods. *Subject Headings:* **1. Vertical wind velocity calculations 2. Wind field velocities in upper troposphere 3. Wind field velocities in lower stratosphere.**—*N.P.S.*

12.7–241 **551.501.75:551.552/3**(213)

Tang, W., **Wind analysis in the tropical zone.** *Meteorological Bulletin*, Taipei, Formosa, 1(3):42–46, Sept. **1955.** 9 figs., 5 refs., 5 eqs. In Chinese. **DLC** (Orientalia)—In order to attempt an analysis of orographic wind and pressure base at low latitude (15′N, centering in Taiwan), the equations by GRIMES and ROSSBY were illustrated to explain closely related problems of isobar, contour on isobaric surface and trajectory. Figures shown in this paper describe the method for drawing isogon, streamline, and upper air chart and diagram, especially in relation to a horizontal speed of both divergence and concentration (overlapping). Ascending and descending air in the tropical line depends on these horizontal and vertical streamlines, at least in Taiwan. *Subject Headings:* **1. Wind analysis in the tropics 2. Taiwan, Formosa.** —*K.C.*

12.7–242 **551.501.75:551.508.54:551.554**

Thornthwaite, Charles W. and Superior, W. J., **Measurement of vertical winds in typical terrain.** Drexel Institute of Technology. Lab. of Climatology, Contract DA-36-039-Sc-78168, First Quarterly Progress Report, Sept. 15–Dec. 14, **1958.** 5 p. 3 figs. **DWB** (M(051)D777me)—Work during the first quarter was directed toward becoming more familiar with the problems of measuring vertical wind through a study of the literature and discussions with other workers in the field. A heated Thermistor Wind Velocity Measuring Instrument was received from the Signal Corps, put into operational condition, necessary wiring diagrams prepared and various laboratory tests were performed with the instrument. A number of circuitry problems were uncovered and investigated. Further development work on a propeller-type anemometer was carried out. Because of the need for considerable design and development work, it is not expected that any field testing of instruments will be attempted before the third quarter of the contract year. *Subject Headings:* **1. Vertical wind measurement 2. Thermistor wind velocity measuring instrument 3. Meteorological instruments.**—*Authors' abstract.*

12.7–243 551.501.75:551.507.7:551.508.54

*Thornthwaite, C. W. and Superior, W. J., **Measurement of vertical winds in typical terrain.** Drexel Institute of Technology. Lab. of Climatology, Contract DA-36-039 Sc-78168, Third Quarterly Progress Report, March 15-June 14, 1959, issued June 1959. 17 p. 4 figs., tables, **DWB** (M(051) D777me)—While the emphasis of the work during the first two quarters was on task A, the development and calibration of reliable measuring instruments, the major emphasis of the work during the third quarter was on task B, the obtaining of actual measurements of vertical winds at one site. A 16 m steel tower was erected in the experimental field behind the Laboratory at Centerton and observations of both the horizontal and vertical components of the wind were obtained at approximately 16 m. The first observations were taken on May 26 while a systematic series of observations were begun on June 3 and has continued on into the fourth quarter. The data through June 15 are included as an appendix to this report. *Subject Headings:* **1. Vertical wind measurements 2. Wind data.**—*Authors' abstract.*

12.7–244 551.501.771:681.177

Bosen, Julius F. (*U. S. Weather Bureau, Wash., D. C.*), **An approximation formula to compute relative humidity from dry bulb and dew point temperatures.** *Monthly Weather Review*, Wash., D. C., 86(12):486, Dec. 1958. fig., ref. **DWB, DLC**—Where t is the dry bulb temperature in °F and t_{dp} is the dew point temperature in °F: $V \cong \left(\frac{173-.1t+t_{dp}}{173+.9t}\right)$ this equation can be solved in a single operation on simple, relatively inexpensive punched card calculating machines, with no preprocessing of the cards. Results are within the limits of accuracy. *Subject Headings:* **1. Humidity calculations 2. Punched card methods.**—*E.Z.S.*

12.7–245 551.501.771 551.571:551.524:519.241.1

Sellers, William D. (*Univ. Arizona*), **A statistical method for estimating the mean relative humidity from the mean air temperature.** *Monthly Weather Review*, Wash., D. C., 88(4): 155–157, April 1960. 2 figs., table, 3 refs., 2 eqs. **DWB, DLC**—This paper outlines a method of estimating the mean relative humidity from the mean temperature. Ordinary linear regression techniques are used, with a correction added to account for the systematic geographical distribution of the regression errors. *Subject Headings:* **1. Mean relative humidity estimations 2. Statistical methods.**—*Author's abstract.*

12.7–246 551.501.777:551.577.21

Zalesskiĭ, F. V., **O metodike opredeleniia sily dozhdia zadannoĭ obespechennosti.** [A method of determining the intensity of rain of a given probability.] *Meteorologiia i Gidrologiia*, Moscow, No. 10:28–31, Oct. 1959. fig., 2 tables, 2 refs., 4 eqs. **DWB, DLC**—A method for precise analysis of data on precipitation recorded by a pluviograph from 1936–1958, is described with mathematical formulas for the maximum amount of rain. It is computed and plotted on the chart on the basis of tabulated data for intensity, duration and probability of the rain. The analysis is extended for various conditions of rainfall, including snow melting and storms. *Subject Headings:* **1. Rainfall intensity data 2. Rainfall probabilities.**—*N.P.S.*

12.7–247 551.501.8 551.508.822

Toivola, Yrjö (*Vaisala Oy, Res. and Development Manager*), **Recent developments in the Väisälä sounding system.** *Vaisala News*, Helsinki, No. 3: 5–6; 15, Oct. 1959. photo, 3 refs. **DWB, DLC**—Recent developments in the fields of aviation and weather forecasting demand improvements in radio sounding system—higher altitudes, improved accuracy and more rapid computation. In view of these requirements major developments in the Väisälä sounding system are shortly to be introduced, especially, those of a new radiosonde model and a new rapid PTU calculation method. This paper gives a short description of these and other recent developments. *Subject Headings:* **1. Radio sounding systems 2. Väisälä radiosonde evaluation.**—*I.S.*

12.7–248 551.501.81:551.578.71

Atlas, D. (*Imperial College, London*); Harper, W. G. (*Met. Off., London*); Ludlam, F. H. (*Imperial College, London*) et al., **Radar scatter by large hail.** *Royal Meteorological Society*, *Quarterly Journal*, 86(370):468–482, Oct. **1960.** 9 figs., 2 tables, 10 refs., 3 eqs. **DLC, DWB.** Also issued as: London, Imperial College of Science and Technology, Dept. of Meteorology, Contract AF 61(052)-254, Technical (Scientific) Note No. 2, Jan. **1960.** 37 p. 9 figs., 2 tables, 11 refs., 2 eqs. **DWB**—Radars with wavelengths of 3.3 and 4.67 cm have been used to measure the back-scatter cross-sections of individual artificial hailstones and their variations as melting occurs. The measurements confirm the cross-sections computed theoretically. An ice sphere is a better scatterer than a liquid water sphere of equal size when its diameter exceeds 0.8 wavelengths; when the diameter lies between 1.2 and 2.3 wavelengths it is better by a factor of 10 or more. This behavior of ice is supported by scatter measurements on a set of plexiglas (perspex) spheres with refractive index close to that of ice. When melting begins, the 3.3 cm cross-sections drop sharply toward the all-liquid values; those at 4.67 cm decrease gradually, and sometimes not at all. The rate of decrease of the cross-sections during melting is also more variable at 4.67 cm than at 3.3 cm. Most of the 3.3 cm change appears to occur during the initial growth of the liquid coat to a maximum thickness of about 0.01 cm, while the major drop in 4.67 cm cross-sections occurs well beyond this stage of melting. The implications are that: (1) a water coat of 0.01 cm thickness has a major effect at 3.3 cm and a minor one at 4.67 cm; (2) liquid continues to collect in sub-surface cracks and cavities in the ice and causes a further decrease in the cross-sections after the maximum thickness of water coat has formed. The final cross-sections are generally within 2 db of the all-liquid value after 7 to 10 minutes of melting at 3.3 cm and after 15 to 20 minutes at 4.67 cm. Possible reasons for these results are discussed. *Subject Headings:* 1. **Radar observation of hail 2. Hail growth. I Macklin, W. C.** —*Authors' abstract.*

12.7–249 551.501.81:551.511:551.577.1

*†Clark, Robert A. (*U. S. Dept. of Interior, Denver, Colo.*), **A study of convective precipitation as revealed by radar observation, Texas 1958–59.** *Journal of Meteorology*, Boston, 17(4): 415–425, Aug. **1960.** 9 figs., 7 tables, 14 refs. **DWB, DLC**—Data collected during the summer of 1958 and the late spring and summer of 1959, by use of an AN/CPS-9 radar located in the Department of Oceanography and Meteorology on the campus of the A. & M. College of Texas, were analyzed to study convective precipitation processes. The formation and growth of convective echoes were studied in relation to the mechanisms of precipitation formation. Consideration also was given to day-to-day variations in convective activity. Pronounced variations were noted in echo growth and subsidence, level of first-echo formation and echo movements. It is shown that maximum echo tops are largely dependent on the depth of the moist layer. It is also revealed that precipitation in the Central Texas region is frequently initiated by a process involving only liquid water droplets. *Subject Headings:* **1. Convective precipitation processes 2. Precipitation formation 3. Radar observations 4. Texas.**— *Author's abstract.*

12.7–250 551.501.81:551.551:551.576.1

Gorelik, A. G. and Chernikov, A. A., **Izuchenie turbulentnosti v oblakakh radiolokatsionnym metodom.** [Investigation of turbulence in clouds by means of radar.] *Moscow. Tsentral'naia Aerologicheskaia Observatoriia, Trudy*, No. 31:54–63, **1959.** 5 figs., table, 6 refs., 10 eqs. **DLC**—The movements of air masses and coagulation of cloud drops are discussed in connection with atmospheric turbulence and long distance propagation of radio waves. A new method was developed in the Radar Laboratory of the Central Aerological Observatory (TS.A.O.) for the study of dynamic processes occurring in the atmosphere and based on the dispersion of radio waves by meteorological objects. The fundamentals of the radar method for the study of the atmospheric turbulences are discussed with details and trigonometric and integral equations. The theoretical considerations for measurement of the turbulences in clouds are discussed with diagrams and electronic schematic arrangement of the radar unit, which is described in details. The results of the experimental studies of reflected signals, velocity spectrum of the turbulent motion, dispersion of separate cloud's parts and water drops are broadly discussed with mathematical analysis and tabulated data on mean square values of the vertical velocity in the various types of clouds. The author suggests further improvements of method and accumulation of more information on distribution and magnitude of the chaotic velocities in the clouds for solution of some theoretical problems and practical application. *Subject Headings:* **1. Turbulence in clouds 2. Radar observation of clouds.** —*N.P.S.*

12.7–251 551.501.81:551.558.1:551.511

Hitschfeld, W. F. (*McGill Univ., Montreal*), **Convective processes in the atmosphere as revealed by weather radar.** *Journal of Atmospheric and Terrestrial Physics*, N. Y., 15(3/4): 288–293, Oct. **1959.** 8 photos, 5 refs.—Convective processes are not limited to the shower type of precipitation. CAPI records show convective processes present under various conditions. They occur in the continuous upglide (during continuous type precipitation), in the downdrafts (stalactites) and in instability snow showers. On occasions of great windshowers and high humidities aloft—large isolated showers develop extensions called plumes. The convection chimney which gives rise to them can be detected on the record. J. S. Marshall and D. Atlas made additional comments. *Subject Headings:* **1. Radar observation of convection 2. Convective rainfall 3. Convective activity.**—*E.Z.S.*

12.7–252 551.501.81:551.515.83(52):551.577.37

Ōtsuka, S. and Ōnuki, M., **A radar detection of the local heavy rainfall at Utsunomiya from Aug. 6th to 7th, 1957.** *Journal of Meteorological Research*, Tokyo, 12(1):38–48, Jan. **1960.** 12 figs., 7 tables, 2 refs. In Japanese; English summary p. 38. **Comment** by S. Yamada and **Reply** by Ōtsuka and Ōnuki. *Ibid.*, 12(9):679–680, Sept. **1960.** table. In Japanese. **DWB, DLC**—During the first part of Aug. 1957, the front crossing Japan was active and accompanied by heavy rainfalls, especially in Tochigi Prefecture from 6th to 7th of Aug. and in Gifu Prefecture on 8th. The authors investigated these phenomena on the basis of PPI scope photographs of radar echoes and surface observational data, and obtained the following results. The distributions of both the radar echo intensity and the 10-min rainfall amount at surface showed a fairly good correspondence. The locations of both the highest radar echo top and the maximum 10-min rainfall amount at surface showed a correspondence of about 80% within a range of 30 km under the consideration of each error. The radar echo top was always higher than 7000 m in the source of the local heavy rainfall in a short time, but only a radar echo top higher than 7000 m does not always correspond to the heavy rainfall. The movement of convective radar echoes seems to depend on the wind in 850–700 mb layer and, in our case study, the vertical and horizontal shears were considerably strong in 850–700 mb layer near Utsunomiya on 7th of Aug. 1957. *Subject Headings:* **1. Radar rainfall intensity studies 2. Heavy rainfall data 3. Cold front effects on precipitation 4. Utsunomiya, Japan.**—*Authors' abstract.*

12.7–253 551.501.9:551.501.7:661.96

Dolgin, I. M.; Pikasin, Ia. S. and Sokolov, S. I., **Ob usovershenstvovanii metoda dobyvaniia vodoroda na aerologicheskikh stantssiiakh.** [Improvement of the method of producing hydrogen at aerological stations.] *Meteorologiia i Gidrologiia*, Leningrad, No. 3:46–47, March **1959. DWB, DLC**—The authors summarize the various methods in use to produce hydrogen at aerological stations and point out the various defects of the methods which utilize the interaction of ferrous silicon, sodium hydroxide and water, and various types of generators. A new method of producing hydrogen developed recently under the direction of Ia. S. Pikazina is described. It is based upon the interaction of aluminum with water in the presence of an alkali. From 1 kg aluminum and 100 g NaOH 1–1.2 m^3 hydrogen can be obtained. Any kind of water suitable for technical purposes can be used, including sea and hard water, without preliminary heating. The hydrogen is purer than that obtained by the silicon method, and it approximates that obtained by the electrolyte method. The possible self inflammation of the reaction products is excluded and the cleaning of the gas generator is facilitated. It is, however, necessary to select balloons with better indices; for steel balloons a working pressure up to 200 atmospheres, and even higher, is allowed with a slight increase in weight. Types of steel operating at wall temperatures from −40° to +540°C or from −196° to +600°C can be used. The capacity of the balloons vary from 0.4 to 200 lbs. Such balloons in combination with suitable valves would create balloon gas generators providing hydrogen from one charge sufficient to fill one radiosonde sphere. *Subject Headings:* **1. Hydrogen production at aerological stations 2. Aerological stations.**—*I.L.D.*

12.7–254 551.501.9:551.501.7:551.507.25

Huovila, Seppo (*Vaisala Oy, Expert in Physics and Met.*), **On board M/S Angra from Helsinki to Buenos Aires.** *Vaisala News*, Helsinki, No. 3:9–10, Oct. 1959. 2 photos. **DWB, DLC**—A note on the aerological station set up on the Finland-South America liner, M/S "Angra" to gather information on temperature, humidity, and wind conditions in the upper atmosphere, especially in the tropical Atlantic regions. On four voyages from Helsinki to Buenos Aires between Aug. 1957 and Sept. 1958, 362 successful radio soundings and 185 upper wind observations were made. The mean height of the soundings was 20–23 km, and over 100 of the upper wind observations reached at least to the 500 mb level. *Subject Headings:* **1. Aerological stations on ships 2. Meteorology of tropical Atlantic 3. Atlantic.**—*I.S.*

OBSERVATIONAL DATA (551.506)

See also: **Items** 12.7–25 to 12.7–28; **Aerological flights** (Reinhardt), 12.7–61; **Optical obs. of satellites** (Gindin et al.), 12.7–68; **Perlim. investigations for an agroclimat., German Democrat Republic** (Mäde), 12.7–79; **When does spring begin?** (Dolgoshov), 12.7–94; **An index of climatic valuation** (Hader), 12.7–105; **Hurricanes,** 12.7–111; **Atmos. data for BOLO Weapon System,** 12.7–128; **Glaciers of Novaya Zemlya** (Svatkov), 12.7–229; **Numerical assessment of divergence at Singapore** (Bryant), 12.7–271; **Obs. of thunderstorms, N. Mex.** (Moore et al.), 12.7–344.

12.7–255 551.506.1:551.582.2(469)

*Portugal. Serviço Meteorológico Nacional, **Anuario Climatológico de Portugal, Pt. 2, Territorios Ultramarinos: Observações de Superficie.** [Climatological Annual of Portugal, Pt. 2, Overseas territories: surface observations], **Vol. 11, 1957** and **Vol. 12, 1958.** issued **1958** and **1959.** 111 p. and 96 p. Almost entirely tables. (For abstract on Vol. 9, **1955** and Vol. 10, **1956,** *see* 10.3–128, Oct. 1959, *Met. Abs.*) **DWB**—The results of daily surface observations of atmospheric pressure, temperature, humidity, wind direction and velocity, visibility, cloud cover, insolation, soils, precipitation, evaporation and meteorological phenomena are presented. A supplement adds tables, prior to 1957, for S. Tomé and Principe, and for the State of India. *Subject Headings:* **1. Annual climatic data summaries 2. Portuguese Overseas Territories 3. India.**—*O.T.*

12.7–256 551.506.7(612)

*Great Britain. Meteorological Office, **Upper air data for stations maintained by the Meteorological Office: summaries of radio-sonde observations of temperature and humidity and of radar wind measurements at standard pressure levels, 1951–1955, Pt. 5, Benina.** 5 p. 3 plates, 5 tables, 14 refs. Its *M.O.*628 (Pt. 5), 1959. **DWB** (M06.7 G786u)—Standard Meteorological Office upper air data summary for Benina, Libya (32°05′N, 20°16′E) giving monthly data for temperature at standard pressure levels, standard deviations, extremes and monthly mean temperature; tropopause pressures and temperatures (averages and extremes), heights (averages, standard deviations and extremes), mixing ratios (average maximum and minimum) wind direction and speed (vector mean winds and standard deviation, scalar and extreme winds). Plates show annual variation of temperature, height and standard deviation, temperature and pressure at tropopause and seasonal temperature pressure. *Subject Headings:* **1. Upper air data summaries, Benina, Libya 2. Tropopause data, Benina, Libya 3. Upper air wind data, Benina, Libya 4. Benina, Libya.**—*M.R.*

12.7–257 551.506.7(469)

*Portugal. Serviço Meteorologico Nacional, **Anuario Climatologico de Portugal, Pt. 4, Territorios Ultramarinos (Observações de Altitude).** [Climatological Annual of Portugal, Pt. 4, Overseas Territories: upper air observations], **Vol. 9, 1955, issued 1959.** 70 p.; **Vol. 10, 1956,** issued **1959.** 70 p.; **Vol. 11, 1957,** issued **1959.** 72 p.; **Vol. 12, 1958, issued 1960,** 73 p. Almost entirely tables. "Vol. 1–9, 1947–1955, will be issued as soon as possible, but without delaying issue of current volumes." **DWB**—These volumes contain daily upper air observations on atmospheric pressure, temperature and humidity and winds for the stations at Luanda, Angola and at Lourenço Marques, Mozambique. They also contain observations on upper air winds only for fourteen transoceanic stations obtained by pilot balloon, and for Lourenço Marques also obtained by radiosonde-radiowind system. *Subject Headings:* **1. Aerological yearbooks 2. Portugal.**—*O.T.*

12.7–258 **551.506.7:551.557**(265)

*U. S. Joint Task Force Seven, **Meteorological ordnance report, Operation Hardtack, 1958.** Its *JTFMC TP*-10, [1958]. 7 p. tables. **DWB** (M57 U585me)—The results of the 50 upper wind measurements made at the Eniwetok Proving Ground by the Office of Naval Research are briefly described and tabulated. The projectiles obtained data from 150,000 ft down to 100,000 ft and from 70,000 ft down to 40,000 ft. The difficulties which were encountered, are reported. *Subject Headings:* **1. Upper air wind data 2. Operation Hardtack (1958) 3. Eniwetok, Western Pacific.**—*N.N.*

12.7–259 **551.506.8**(436)

†Reiss, M., **Die Phänologie in Österreich seit 1826 und ihre Beziehungen zur Klimakunde.** [Phenology of Austria since 1826 and its relation to climatology.] *Wetter und Leben*, Vienna, 11(5–17):71–115, **1959.** fig., 7 tables, 86 refs. **DLC**—This monograph is a detailed history of the development of phenology in Austria since 1826, when the first phenological observations of MARKS appeared. The period between 1826–1877 is characterized as the "Fritsch Period," and that from 1926 to the present as the "Werneck-Rosenkranz Period." The contributions of FRITSCH to phenology are described in detail. They include among other things his instructions for observations on annuals, biennials, on polyannuals and on woody plants, etc., influence of elevation above sea level, of geographic latitude and longitude and of local anomalies upon the development of woody plants and nonwoody plants, etc. The development of phenology since 1877 in Germany and Holland to the present is sketched briefly. The contribution of WERNECK including observation procedures, establishment of vegetation regions for the ndividual provinces of Austria, extension of phenological network, etc. and the work of ROSENKRANZ, etc. are summarized. Tables giving long period phenological observations for Austria are presented. Finally, an analysis of phenological data during the past 80 years in the light of the gradual warming up of climate indicates that no clear acceleration of the phases of phenological indications during the present century in comparison to the past century can be established in so far as representative plants of the pre-spring period are concerned. However, n the post-spring period a definite acceleration in development is apparent in the present century. *Subject Headings:* **1. Phenology 2. Austria.**—*I.L.D.*

12.7–260 **551.506.8:551.586:581.14**

*†Pfeifer, Fritz, **Untersuchungen über den Wärmehaushalt von Plflanzen in Verbindung mit phänometrischen Messungen.** [Investigations on the heat economy of plants in relation to phenometrical measurements.] *Leipzig. Universität f. Agrarmeteorologie, Veröffentlichungen*, 1(4):179–246, **1959.** 44 figs., 7 tables, 93 refs. **DWB** (M(055) L531ve)—The effects of the heat budget, as reflecting the physical meteorological conditions of the environment, upon plant growth and the procedures and validity of various phenometric methods are nvestigated. This comprehensive study comprises the following: a literature survey of esearch on the significance of heat transformation in plant growth and the relationship between ocal climate, plant stand climate and plant climate; methods and instrumentation for measuring the heat transformation of plants and plant organs, including the measurement of radiation vith a radiation balance meter and a pyranometer; measurement of atmospheric temperature nd relative humidity with a psychrometer; temperature distribution in leaves and shoots, heat ransformation in leaves and in plant stands; the concept and history of phenometry; the nethods of measurement and instrumentation; measurement errors; evaluation of phenometric neasurements; survey of the weather near Leipzig during the growing seasons of 1955 and 956; the morphology of growth curves for length, area and thickness of plants; influence of veather upon plant growth, including the effect of annual weather, warm and cold periods, the lependence of growth upon the weather of the preceding day and spontaneous variation in rowth as related to daily variation of the meteorological elements. Extensive data are resented in graphs and tables. *Subject Headings:* **1. Heat budget of plants 2. Plant bioclimatology 3. Phenological data.**—*I.L.D.*

12.7–261 551.506.7:551.507.3

*Angell, J. K. and Pack, D. H., **Analysis of some preliminary low-level constant level balloon** (**Tetroon**) **flights.** Wash., D. C., U. S. Weather Bureau, March **1960.** 38 p. 13 figs. (incl. photo), 5 tables, 16 refs., 10 eqs. **DWB**—Data of interest and importance can be obtained from low-level tetroon flights even when the radar tracking is not too precise. Information can be obtained on high frequency Lagrangian oscillations. With the inclusion of transosonde data, information becomes available concerning Lagrangian fluctuations with periods from a few tens of seconds to a week with only a slight gap at periods of 3–8 hours. Work is progressing on the development of a very light-weight transponder which can be attached to the tetroons in order to increase the tracking range. *Subject Headings:* **1. Constant level balloon data 2. Tetroon flights.**—*E.Z.S.*

12.7–262 551.506:551.508.77

Johannsen, Hans Hinnerk, **Eine einfache Darstellung der Ergebnisse von Schreibregenmesser-Aufzeichnungen.** [Simple presentation of recording rain gage data.] *Germany. Deutscher Wetterdienst, Berichte,* 8(54):114–118, **1959.** 4 figs., 2 tables, 13 refs. German and English summaries p. 114. **DWB, DLC**—In preparing rain records, general principles of mathematical statistics are only used when the records are evaluated in equidistant intervals of time, amount or intensity of precipitation, respectively. Simultaneous values from different stations of observation can only be obtained by means of equidistant intervals of time which are, therefore, to be preferred. An interval of 5 min may be considered the smallest interval which can be evaluated from records of the self recording rain gage of HELLMANN without remarkable difficulties. It is shown how simple results can be obtained for routine work; the distribution of rain intensities may be approximated by a normal distribution when the collective values are divided into logarithmic classes of rain intensity. *Subject Headings:* **1. Rain gage data analysis. 2. Hellmann rain gage 3. Germany.**—*Author's abstract.*

12.7–263 551.506.1:551.521.12:551.524.31(769)

Penrod, E. B.; Walton, W. W. and Knight, H. O. (*all, Univ. Kentucky, Lexington*) **Solar energy measurements at Lexington, Kentucky, for 1951.** *Kentucky Academy of Science, Transactions,* 20(1/2):4–10, **1959.** 3 figs., table, 8 refs. **DWB** (M21.1 P417so)—The present paper is an initial report on a ten-year research project in progress at the University of Kentucky designed to measure solar energy that falls on a horizontal surface. In this research a 50-injunction type Eppley pyrheliometer is being used. By the use of this pyrheliometer, solar energy falling on a horizontal surface at Lexington has been measured since Oct. 14, 1950. Measurement data concerning solar energy and mean daily temperature for Jan.–June 1951 and for July–Dec. 1951 are discussed and graphically represented. Monthly average value of solar energy and air temperatures are also graphically represented. Total and average solar energy for 1951 are tabulated. *Subject Headings:* **1. Solar energy measurement data 2. Diurnal temperature data 3. Eppley pyrheliometer 4. Lexington, Ky.**—*I.S.*

12.7–264 551.506.3:551.521.1(439.1)

Dobosi, Zoltán and Takács, Lajos, **A globális sugárzás területi eloszlása Magyarországon.** [Regional distribution of global radiation in Hungary.] *Időjárás,* Budapest, 63(2):82–84, March/April, **1959.** 4 figs., table, 3 refs. Hungarian and Russian summaries p. 82. **DLC**—The reduced distribution of global radiation for 1901–50 is presented. The radiation values were computed by relationships of the duration of the registrated sun-light and of the global radiation. *Subject Headings:* **1. Global radiation data 2. Global radiation distribution 4. Hungary.**—*Transl. of authors' abstract.*

12.7–265 551.506.3:551.521(439.1)

Takács, L., **Normalwerte der Globalstrahlung in Budapest.** [Normal values of global radiation at Budapest.] *Időjárás,* Budapest, 62(2):65–72, March/April **1958.** 2 figs., 12 refs. English summary p. 65. Hungarian summary p. 71–72. **DWB, DLC**—Global radiation at Budapest has been recorded since 1937 by means of a Robitzsch pyranograph. However, due to inadequate calibration of instruments during and after the war, the data obtained cannot be considered to be homogeneous and reliable. The author discusses the usefulness of a modified orecht formula for converting direct solar radiation measurements into global radiation lues. There is good agreement between global radiation values as determined by this mula and as measured in Budapest in 1954–1958. *Subject Headings:* **1. Global radiation easurement techniques 2. Budapest, Hungary.**—*G.T.*

12.7–266 551.506.1:551.582.2/3(512)

*Hong Kong. Royal Observatory. **Meteorological results 1956, Pt. 1, Surface observa- ns.** *Pub. Hong Kong, Government Press,* **1958.** 92 p. tables, maps. **Meteorological sults 1957, 1958, 1959.** Pub. 1959. **DWB, DLC**—The results of daily observations for 1956 e presented by monthly tables of pressure, temperature, dew point, cloud amount, sunshine, nfall, wind direction and velocity. The tables of monthly prevalence of phenomena for 56 include frequencies of wind directions and visibility, and number of days with lightning, under and thunderstorms. There are also tables for monthly values and extremes for 1956; onthly normals for 1884–1939 and 1947–1950; extreme values for 1884–1939 and 1947–1956; e-day means for 1956 and 1884–1939, 1947–1950; monthly values of grass minimum and earth mperatures for 1956; monthly mean sea surface temperatures at Waglan Lighthouse and at i Tah (Hong Kong airport) for 1956 and finally, rainfall at outstations for 1956. Description instruments and methods of various observations are presented in the introduction. Illustra- n for typhoon tracks for Jan.–Aug., 1956 and a rainfall chart for 1956 are presented in the ded maps. *Subject Headings:* **1. Annual meteorological data summaries 2. Hong Kong.** *D.T.*

12.7–267 551.506.1(51) 551.5:06(058)

Hong Kong. Royal Observatory. **Annual departmental report for the Financial Year 57/58.** Issued Hong Kong, **1958.** 23 p. 8 tables. Price: $1.50. **DWB, DLC**—Describes e yearly work of the Hong Kong Royal Observatory for 1957–58. There was excessive rain- l in 1957, i.e., 116.15 in. which was 31.40 in. above the normal. The highest temperature corded was 93.5°F on Aug. 14. The Central Forecasting Office of the Observatory started rk on May 1st. Weather broadcasts were received from the surrounding countries such as ina, India, Malaya and the Philippines. The Observatory also issued storm warning bulle- s for the benefit of ships. *Subject Headings:* **1. Meteorological data 2. Annual reports Hong Kong Royal Observatory 4. Hong Kong.**—*A.H.K.*

12.7–268 551.506.7

Sumi, T. (*Aerological Obs.*), **The time variations of upper air pressure, temperature, w-point temperature and wind velocity.** *Tateno, Japan. Aerological Observatory, Journal,* 4):180–189, Jan. **1960.** 4 figs., 4 tables, 4 refs., 4 eqs. In Japanese; English summary 180. **DLC**—An aerological observation by radiosonde takes from 1–1.5 hrs from beginning end. Moreover, if the observation ends in failure at a height lower than a provided pressure el, another observation is required. The latter observation is begun at about one and a half s later on the average than the provided regular time. It should, therefore, be regarded at the observed values of aerological elements included the variation during the above entioned time intervals. It is necessary to estimate the variation in such a time interval as s, in carrying out the statistics and analysis of the observed results. Furthermore, the imation of these amounts of variation, in connection with the observational error, will give effective aid to the determination of the most suitable time interval between successive servations. In this paper, estimation of the variations during 1–6 hrs with regard to the ight, temperature, dew point temperature and wind velocity at 700–200 mb (Fig. 3), and me comparisons of these variations with the random error of observation are reported. *bject Headings:* **1. Meteorological data analysis 2. Forecasting data requirements 3. Japan.** *Author's abstract.*

12.7–269 551.506.22:551.507.321:551.510.72:551.510.528

Mantis, Homer T. and Winckler, J. R. (*both, Univ. Minn.*), **Balloon observation of artificial lioactivity at the base of stratosphere.** *Journal of Geophysical Research,* Wash., D. C., (11):3515–3519, Nov. **1960.** 3 figs., table, 6 refs., 2 eqs. **DWB, DLC**—On two ascents of a ies of IGY cosmic ray balloon flights, layers of radioactivity were observed near the tropopause at Minneapolis, Minnesota. On March 21, 1958, a specific activity of 0.8×10^{-5} disintegrations/cm³ sec was observed and on Oct. 31, 1958, the value was 0.4×10^{-5}. Upper-ai trajectories were constructed for the events, and these, together with the mean energy, specifi activity, and vertical profiles of the radiation, are consistent with the hypothesis that this radioactivity was produced by Soviet nuclear bomb debris about 1 week old. *Subject Headings* **1. IGY research 2. Balloon soundings 3. Radioactivity in the upper atmosphere 4. Tropopause data.**—*Authors' abstract.*

INSTRUMENT CARRIERS (551.507)

See also: **Weather reconnaissance obs.,** 12.7–17; **Outer radiation belt and solar proton obs. with Explorer VII** (Van Allen, Lin), 12.7–188; **Met. measurements and field program of Project Jet Stream** (Endlich, Rados), 12.7–236; **Determination of atmos. turbulence spectrum from airplane sounding data** (Ivanovskiĭ, Chermisin), 12.7–238; **Measurement of vertical winds in typical terrain** (Thornthwaite, Superior), 12.7–243; **Aerological station on m/s "Angra"** (Huovila), 12.7–254; **Analysis of low level constants balloon flights** (Angell, Pack), 12.7–261; **Balloon obs. of artificial radioactivity** (Mantis, Winckler), 12.7–269; **Numerical assessment of divergence at Singapore** (Bryant), 12.7–271; **Ship's anemorhumbometer** (Sternzat et al.), 12.7–287; **Electrolytic water vapor detector for balloon measurement of water content of atmos.** (Waters), 12.7–292; **Structure of hurricane "Daisy"** (Jordan et al.), 12.7–341.

12.7–270 **551.507.22:598.**

McLean, I. (*Met. Off., Great Britain*) and Williamson, K. (*Migration Research Officer British Trust for Ornithology*), **Migration notes from the Western Approaches, spring 1958** *Marine Observer*, London, 30(190):204–207, Oct. **1960.** 4 figs. **DWB, DLC**—The articl reports observations of birds from the British weather ship "Weather Watcher" at Station from 13th April to 13th May. Considerably more migration was witnessed than during th first three weeks of April, 1957 and altogether 72 individuals of a dozen species were seen Detailed notes are given of the observations of the various types and their behavior. description is also given of the synoptic conditions prevailing. *Subject Headings:* **1. Bir migration observation 2. Synoptic conditions at Station K.**—*R.B.*

12.7–271 **551.506.7:551.507.321.2:551.511:551.557.2**(595.13

Bryant, K., **An attempt at numerical assessment of divergence at Singapore.** *Meteorological Magazine*, London, 88(1047):270–272, Oct. **1959.** fig., 3 tables, 4 refs. **DWB, DLC**— The paper reports a study to find whether divergence or convergence could readily be obtaine from pilot balloon data. It is based on the results of an intensive program of 17 half-hourl pilot balloon ascents to 10,000 ft from five stations in Singapore Island, carried out on Feb. 4 1958 during the height of the North-East monsoon. The synoptic situation over Singapor during the period of the ascents is also given. An arithmetical analysis was made of the tota "inflow" and "outflow" of wind over a given area at any one level, using the mean winds at tha level blowing into or out from the triangles formed by the pilot balloon stations. The presen paper compares the results of this analysis with Kindle's values, showing the rates of convergence or divergence to be associated with various weather phenomena. It is concluded tha some method other than the direct approach using observed winds must be found if convergenc or divergence are to be used for forecast purposes in the tropics. The paper includes tabulation of Kindle's values, examples of computed values of divergence obtained in various areas of th island, and mean values of divergence at any level between 1000 or 5000 ft. *Subject Heading* **1. Pilot balloon data, Singapore 2. Synoptic conditions over Singapore 3. Forecasting in th tropics 4. Singapore.**—*I.S.*

12.7–272 **542.941:551.507.321.**

Pikazin, Ia. S. and Rybakov, E. T., **Aliumosilikolevyĭ sposob polucheniia vodorod** [Hydrogen production by means of aluminum silica.] *Meteorologiia i Gidrologiia*, Mosco No. 4:47–48, April **1960.** **DWB, DLC**—The chemical reactions proceeding in the productio of hydrogen by the reaction of silica with sodium hydroxide and by aluminum with wate in the presence of an amount of catalytic sodium hydroxide is outlined with the aid of th evant chemical equations. It is pointed out that the silica method suffers from the dis- vantage of requiring the heating of water for inducing the reaction while the aluminum thod proceeds at a temperature less than 100°C owing to the large amount of heat developed. e aluminum reaction actually begins immediately at a temperature of −50°C with water at emperature of +2 and +4°C. But the aluminum method has the disadvantage that owing the extreme speed of the reaction and the high exothermic temperature it is difficult to use generation of either high or low pressure. As a result of the inadequacies of both methods the fact that ferrosilicates are very inexpensive for producing hydrogen and will be always eaper than aluminum, the authors propose the use of a new aluminum silica method for ducing hydrogen. The hydrogen is produced by the interaction of a mixture of ferrosilicate aluminum with a base in water. The aluminum serves to develop the high temperature is the support for the reaction of ferrosilicate with base without the need to heat the water. amples of the use of this method and the results obtained are presented. *Subject Headings:* **Hydrogen generation 2. Pilot balloon inflation.**—*I.L.D.*

12.7–273 551.501.7:551.507.321.2

Plantier, Michel and Magniez, Robert (*both, Météorologie Nationale, Paris*), **La vitesse ensionnelle des ballons de radiosondages à la base Dumont-d'Urville.** [Ascension rate of iosonde balloons at the Dumont-d'Urville Base.] . *La Météorologie*, Paris, Ser. 4, No. 57: –160, Jan./March **1960.** 23 figs., 8 tables, 3 refs. French, English, Spanish and Russian nmaries p. 141. **DWB**—Study of the ascensional speed of radiosonde balloons based on nchings made in Adélie Land from June 1 to Dec. 31, 1957. After a short survey of the ditions of soundings, some comments are made on the average ascensional speed up to mb. Fairly large amplitude variations are noted and the average speed ranges from 5.9 7.3 m/sec. The average ascensional speed, when the sky is very cloudy seems to remain stant from month to month; when the sky is clear an appreciable difference is recorded ween the months of July and Aug. The examination of the ascensional speed variation the altitude shows that in the lower layers of the atmosphere, the speed first increases rather ckly and then diminishes. However, above this friction zone, the speed increases with a re or less marked irregularity at the tropopause level and there is a brisk and quick decrease the ascensional speed from 10,000 to 12,000 m. Between 2000 and 9000 m altitude ed varies according to the law $\rho-1/6$. The rapid decrease above 12,000 m can be at- uted to the modifications of the properties of the envelope. These modifications can take ce at 8000 m if the balloon has been subjected to strains at the take-off. No relationship ms to exist between ascensional speeds and the variations in the gradient of temperatures wind. The test in λ^2 does not supply significant values on this subject. *Subject Headings:* **Balloon ascension rates 2. Cloudiness-ascension rate relationships 3. Temperature wind dient effects on balloon trajectories 4. Dumont-d'Urville Station, Antarctica.**—*A.V.*

12.7–274 551.507.321.2

Shechet, M. L. (*Convair Sci. Res. Lab., San Diego, Calif.*), **Lightweight suntracker for oon applications.** *Review of Scientific Instruments*, N. Y., 31(5):546–550, May **1960.** s., 2 foot-refs. **DWB, DLC**—A lightweight inexpensive suntracker for balloon applications escribed. The entire tracking system including power supplies for a 12-hr flight weighs kg. The system has demonstrated in the laboratory a capability of pointing a 1.42-kg at the sun within ±0.12°. A very simple and reliable acquisition and tracking technique mployed which uses no vacuum tubes or transistors. *Subject Heading:* **1. Balloon equip- nt.**—*Author's abstract.*

12.7–275 551.507.321.2:061.6

†U. S. Air Force. Missile Development Center, Holloman Air Force Base, N. Mexico, **tributions of balloon operations to research and development at the . . . Center, 1947– 3.** Prepared by the Historical Branch, Office of Information Services, 1959. 140 p. refs. nd of each ch. photos. **DWB** (M08.32 U58con)—A carefully documented history of the tributions of twelve years of balloon operations is presented. It includes chapters on origin expansion of Holloman balloon operations; operations research and development missions; oons as missile targets and rocket launchers, including the development of target balloon

systems and the Hi-Fly target development. Balrok and "Cree" missile cluster; technica advances in balloon operations, dealing with the evolution of balloon launching techniques, and balloon instrumentation, tracking and recovery and finally, administrative problems are described. A glossary, a gazetteer and an index are included in the work. *Subject Headings:* **1. Balloon operations 2. Balloon instrumentation.**—*O.T.*

INSTRUMENTS (551.508)

See also: **Hydromet. instruments,** 12.7–18; **Väisälä sounding system** (Gröndahl), 12.7–29; **Ground based infrared radiometer for obs. of satellites** (Gelinas), 12.7–69; **Infrared spectro-radiometer for obs. of earth from high altitude** (Willey), 12.7–72; **Obs. of audio-frequency electromagnetic noise** (Watts), 12.7–142; **Anomalies on ionosonde records** (Munro), 12.7–151; **Large-sized recording evaporimeter** (Uehara), 12.7–225; **Aerodynamic investigations of aerological instruments** (Nepomniashchiĭ), 12.7–235; **Empirical study of vertical velocities** (Epstein), 12.7–237; **Measurement of vertical winds** (Thornthwaite, Superior), 12.7–242; **Measurement of vertical winds in typical terrain** (Thornthwaite, Superior), 12.7–243; **Väisälä sounding system** (Toivola), 12.7–247; **Presentation of rain gage data** (Johannsen), 12.7–262; **Formation of rainbows in a search-light beam** (Ananthakrishnan, Venkiteshwaran), 12.7–451.

12.7–276 551.508.21:551.511.33:551.52

Clarke, David B., **Measurements of radiative flux from an airborne radiometer.** Wood Hole Oceanographic Institution, Mass., Contract Nonr-1721 (00) (Nr-082-021), (Marin Meteorology), Technical Report No. 43, Aug. **1959.** 14 p. 4 figs. (incl. photo), 2 tables 7 refs. **DWB**—This report describes an airborne instrument that is being developed to investigate the radiative heat balance in the lower troposphere and the first results obtained with it The instrument, an adaption of Suomi and Kuhn's (1958) "economical" or "poor man's" radiometer, essentially derives the radiative flux by measuring the temperature on opposite side of an insulator. It was mounted on a R4D Naval Research airplane and in Nov. 1958 wa flown from Woods Hole to Trinidad and back with several intermediate stops. Radiatio measurements were made along the route but for the most part they were obtained in an area about fifty miles east of Trinidad. Early work on the tropospheric radiative problem relie primarily on indirect theoretical calculations based on the absorption of radiation by wate vapor and carbon dioxide. The Elsasser chart was one such method developed for this purpose From it one could compute the radiative flux at different altitudes given the vertical distributio of temperature and humidity. Using this chart LONDON (1957) made an extensive study of th radiative budget for the Northern Hemisphere. Recently, several investigators have attempted to measure the radiative flux directly. BREWER and HOUGHTON (1956) installed radiometer in an airplane and took observations up to 40,000 ft. SUOMI, STALEY, and KUH (1958) and GERGEN (1958) have used balloon-borne radiometers up to less than 100 mb. Al their results have agreed fairly well with computations based on radiation charts. However these comparisons can only be made with clear skies or a solid deck of clouds. With variabl cloudiness or thin clouds, such as cirrus, theoretical calculations become uncertain and direc measurements yield the most accurate results. The oceanic trade wind regions have occupie much of the attention of the Woods Hole meteorologists. There, direct observations from a airplane are the best way to attack this problem because radiosonde soundings are often no available, large areas can be surveyed quickly, and variable cloudiness presents less of problem. There is a further advantage in that the results may be tied in with BUNKER's (1957 turbulent heat flux study which was continued on this field trip. *Subject Headings:* **1. Radiati heat balance measurements 2. Radiative transfer 3. Radiometers.**—*Author's abstract.*

12.7–277 551.508.25:547.97

Dirmhirn, Inge (*Vienna*), **Ein einfacher Empfänger zur Messung der Chlorophyllabsorption.** [A simple element for measuring chlorophyll absorption.] *Wetter und Leben*, Vienn 12(1/2):15–19, **1960.** 3 figs., 2 tables, 2 refs. German and English summaries p. 15. **DLC**— The author describes the characteristics and operation of interference filters which by continuous variation of the transmissivity region in a longitudinal axis of the filter make it possib to adjust the spectral sensitivity of selenium photoelectric cells to individual biological actio ves such as the absorption of radiation by chloroplasts which have two absorption maxima. e apparatus consists of a selenium photoelectric cell, 80 mm in diameter. The filter is dge-shaped and very thin (in the order of magnitude of the wave length of light); and sists of glass plates upon which metal has been evaporated. The glass plate is also an orption filter with a variable transmissivity region. For the chlorophyll absorption receiver filter is Veril-3-50 continuous interference filter. Tables giving technical data of the erference filter for the chlorophyll absorption receiver, correction factors for the selenium otoelectric element, the maximum transmissivity, half widths, etc., graphs showing the orophyll absorption curve spectral sensitivity of the selenium photoelectric cell etc. and grams showing the construction of the receiver are presented. *Subject Heading:* **1. Chloro-ll absorption measuring apparatus.**—*I.L.D.*

12.7–278 551.508.29:621.35:551.524.3

Nemchenko, V. I., **Termobatarei dlia izmereniia pul'satsiĭ temperatury vozdukha.** hermal batteries for measuring air temperature pulsations.] *Akademiia Nauk SSR. rskoĭ Gidrofizicheskiĭ Institut, Trudy,* 13:73–77, **1958.** 3 figs., table, 2 refs. **DLC, /B** (M(055)A313tr)—The differential thermal battery for recording pulsations of atmos-eric temperature selected for operation with the oscillograph POB-12 with a galvanometer ^{8} a/mm and $R=1600$ ohm consists of constantan wires with a diameter of 0.05 mm and tains 300 junctions. The construction of this apparatus is described. An installation for ermining the time constant and sensitivity of a thermal battery is described, and data giving omparison of the computed and theoretical sensitivity are presented. *Subject Headings:* **hermal batteries 2. Temperature pulsations 3. Temperature measuring devices.**—*I.L.D.*

12.7–279 551.508.4

Yajima, Y., **On the responses of barometers.** *Journal of Meteorological Research*, Tokyo, 7):647–649, July **1959.** 3 figs., table, ref., 12 eqs. In Japanese. **DWB, DLC**—Responses barometers are determined by the lag in the observation of pressure in motion, and without roper correction the correct value is not possible. The author has introduced a fundamental nula for checking several responses to various changes:

$$\frac{dp}{dt} = -\frac{1}{\lambda}(p-p_e)$$

ere p_e=air pressure (mb), p=indicator of barometer (mb), λ=lag (min). Then, the re-nses were observed for varying conditions of p_e, namely: in a case of no motion for p_e, in a e of diametrical change for p_e, and in a case of periodical change for p_e. The results are wn in a table including the value of dynamic error and in figures including the trend of lag. *ject Heading:* **1. Barometers.**—*K.C.*

12.7–280 551.508.4

Yoshitake, M.; Shimizu, I. and Takeuchi, K. (*all, Japan Met. Agency, Tokyo*), **An absolute ndard barometer.** *Meteorological Society of Japan, Journal, Ser. 2,* 37(3):104–110, June **9.** 2 figs., 5 tables, 4 refs. English summary p. 104; Japanese summary p. 110. **DWB, C**—An absolute standard barometer recently installed at the Japan Meteorological Agency, yo, is described. It is essentially a syphon barometer made of glass tube 30 mm in internal neter. The two mercury meniscuses can be equally formed by operating the mercury ervoir hydrostatically connected with the mercury column. The vacuum in the space ve the mercury is measured by a Geisler tube. The barometric height is read measuring position difference of two meniscuses by means of a standard scale and a cathetometer. e average temp. of the mercury columnis determined from the readings of two thermometers hung on the mercury column. It was intended that the accuracy of a single reading of the ometer should be in the order of 0.01 mm Hg. while in practice it is found that the standard iation of errors included in the observed values is 0.03 mm Hg. The result of its comparison n the present JMA's standard barometer gives that the mean correction of the JMA's ndard in relation to the new absolute standard barometer is −0.20 mm Hg. *Subject dings:* **1. Absolute standard barometer 2. Japan.**—*Authors' abstract.*

12.7–281 551.508.4

Manuĭlov, K. N., **Nekotorye sposoby temperaturnoĭ kompensatsii membrannykh barome tricheskikh priborov.** [Certain methods for the temperature compensation of aneroi barometers.] *Leningrad. Nauchno-Issledovatel'skiĭ Institut Gidrometeorologicheskogo Pri borostroeniia, Trudy*, No. 7:99–104, **1959.** 2 figs., 2 tables, 4 refs., 6 eqs. **DWB**—Afte discussing briefly the degree of precision required for the pressure element of a radiosonde, th sources of temperature errors of aneroid barometers and the formula for temperature correc tions, the author examines the various methods of automatic temperature correction of aneroi barometers. The most widely used temperature compensation of aneroids is that involvin thermal bimetallic plates. The compensators whose action is based upon the variation of th position of the links of the mechanism as a result of temperature deformation of bimetalli plates is termed kinematic. The kinematic temperature compensation presupposes a trans mission mechanism with conductors in the form of two plates, one of which is rectangular an the other wedge shaped with a given angle of slope. There are two types of temperatur compensation. Type I is provided by a bimetallic plate fastened to the membrane of th barometric box and serving to move links of the mechanism during temperature variation The apparatus is so constructed that during surface pressure variation the displacement com pensates for the temperature deformation of the aneroid box and the connecting rod joining th aneroid box with the mechanism is at right angles to the rib. In the Type II compensatio the bimetallic plate is on the rib of the transmission mechanism. During temperature variatio the bimetallic plate is distorted because the length of the rib and transmission ratio of th mechanism alter. The latter compensates for the variation in sensitivity of the aneroid bo The construction and operation of the pressure unit of the A-22-III radiosonde provided wit the Type II temperature are described with the aid of a diagram and relevant formulas. Dat on the temperature values of the coefficients of pressure unit of radiosondes built by the Rig factory of hydrometeorological instruments are presented. *Subject Headings:* **1. Aneroi barometer temperature corrections 2. Aneroid barometer compensators 3. Kinemat temperature compensation.**—*I.L.D.*

12.7–282 551.508.54:551.551:551.515

Frankfurt, M. O., **O raschete peregruzok bystrokhodnykh vetrokoles pri poryvakh vetra shkvalakh.** [Calculation of the overload of high speed wind mills during gusts and squalls (In: Akademiia Nauk SSSR. Energeticheskiĭ Institut, **Voprosy vetroenergetiki.** Moscow **1959.** p. 90–105. 10 figs., 7 refs., 13 eqs.) **DWB** (M56.3 A313vo)—The aerodynamic metho of the computation of variably acting forces on the wind wheel is discussed with mathematic formulas and graphic vector analysis. Variations of wind forces are considered not only their structure, but also on rapidity of the response of the regulating system of the wind mot (reduction of area and angularity of the wheel blades). The overloading of the wheel by sudde squalls has often occurred under large angle of attack; therefore, its strength must be carefull computed. Discussion of the above problems is mainly extended to general cases and preci solution is suggested for specific wind motor and its dynamic conditions, in which the regulatio of the wind-motor is provided by the automatic turn of the wheel blades by aerodynamic force These forces are very sensitive to the wind variations. The discussion is started by determin tion of the bending forces acting on the wheel, accompanied by construction of diagram, in Polar coordinates for total aerodynamic forces. The overloading is computed wi available experimental characteristics of the wind wheel. Coincidence of the computed ove load of the wheel with experimental data is graphically illustrated. Specific method of com puting the overload under squalls is described with mathematical formulas and charts. *Subj Headings:* **1. Wind wheels: or Windmill anemometers 2. Gusts 3. Squall measurement** —*N.P.S.*

12.7–283 551.508.

Kamamoto, H. and Miyashita, M., **Dynamic characteristics of rotation anemometer** *Journal of Meteorological Research*, Tokyo, 12(3):147–154, March **1960.** 9 figs., 2 table 8 refs., 17 eqs. In Japanese; English summary p. 147. **DWB, DLC**—To compare the dynam characteristics of 3 cup-, 4 cup- and windmill-type anemometers currently used in JM Schrenk's parameter K is calculated according to the method used by Schrenk, Deacon a

NUKI. Next, the over-estimation factors for each anemometer exposed to the sinusoidally ctuating wind are compared. Third, a transient response factor k, which is independent of e fluctuation period of wind and is better than K for comparing the characteristics of emometers as an anemometer for instantaneous speed, is introduced. Lastly, the cross wind ect on the windmill-type anemometer is examined. As a result, it is concluded that the ndmill-type anemometer has the best dynamic characteristics, except in the strong cross nd. And it is suggested that the best anemometer may be obtained by some improvement 3 cup anemometer such as the use of cups made of aluminium alloy in place of brass. *Subject ading:* **1. Anemometers.**—*Authors' abstract.*

12.7–284 551.508.54:551.551.2

Konstantinov, A. R., **Trekhlopastnyĭ anemograf—pribor dlia registratsii gorizontal'noĭ i rtikal'noĭ sostavliaiushchikh skorosti vetra v prizemnom sloe atmosfery.** [Three-blade emograph, an instrument for recording the horizontal and vertical components of wind eed in the air layer near the ground.] *Leningrad. Gosudarstvennyi Gidrologicheskiĭ Institut, udy*, No. 70:84–95, **1958.** 6 figs., 14 refs., 18 eqs. **DWB**—The author describes with the l of a diagram the construction of the three blade anemometer capable of recording syn-ronously the module of the velocity vector and its inclination to the horizontal. The locity vector is determined according to the Wild principle; the inclination is recorded by eans of a balanced vane rotating around the horizontal axis and fixed along the velocity ctor. The procedure for calculating curves of the three blade anemometer is presented; the rors of the three blade anemometer resulting from construction factors are examined; the perimental verification of the calibration curves of the instrument are described. The riods of actual oscillation of the instrument's blades are determined and the operation of e instrument under field conditions and the method of analyzing the anemograms are outlined. *bject Headings:* **1. Anemometers 2. Wind speed components 3. Anemogram analysis.** *I.L.D.*

12.7–285 551.508.54

*Yajima, Y., **On the response of anemometers in fluctuating wind.** *Journal of Meteoro-ical Research*, Tokyo, 12(1):55–57, Jan. **1960.** 6 tables, 5 refs., 5 eqs. In Japanese. **DWB** In order to find out the effect of anemometers on the computed value of wind, various emometers such as three-cup, four-cup, Dines, propeller and three-cup electric were used in e investigation of wind speed and its periodicity of motion. The response of each emometer to the Schrenk coefficient at the time of wind speed variation was sought and mputed for the purpose of comparison and the values are shown in tables. Next, mean wind eed and maximum instantaneous wind speed were investigated by each anemometer and the ult was summarized as follows: propeller type was superior for the use of mean wind speed, d three-cup type had most accurate coefficient in computation. *Subject Headings:* **1. Ane-ometers 2. Wind speed measurement.**—*K.C.*

12.7–286 551.508.56/57

Väisälä, Vilho (*Vaisala Oy.*), **Corrections to be used when comparing radiotheodolite h an optical theodolite.** *Vaisala News*, Helsinki, No. 4:10–14, Dec. 1959. 3 figs., 2 tables, refs., 15 eqs. **DWB, DLC**—In the comparison of elevation and azimuth angles, measured h the radiotheodolite and an optical theodolite, the small systematic elevation and azimuth gle errors must be taken into account, especially when the radiosonde is not far away from e theodolites. The present paper discusses these errors and suggests formulas for the correct ermination of the exact direction of the sight line from the antenna to the radiosondes. *bject Headings:* **1. Radiotheodolite computations 2. Optical theodolite computations Theodolite observation errors.**—*I.S.*

12.7–287 551.507.2:551.508.59

Sternzat, M. S.; Shadrina, E. N.; Il'in, B. V. et al., **Korabel'nyĭ anemorumbometr.** hip's anemorhumbometer.] *Leningrad. Nauchno-Issledovatel'skiĭ Institut Gidrometeoro-icheskogo Priborostroeniia, Trudy*, No. 7:155–167, **1959.** 8 figs., table, 3 refs. **DWB**—The erating principles and construction of an automatic ship's anemorhumbometer developed in the A. I. Voeikov Principle Geophysical Observatory are presented. The apparatus consisting of a sensor measuring apparent wind velocity, a central unit containing the computing mechanism for solving the equation for wind direction and speed, a time commutater, the servo-intensifier and servo-motor, etc., the repeaters and the junction box are described with the aid of diagrams, photographs and circuit diagrams. Their operation and installation are described. The measurement of wind speed and direction is accomplished by solving the equations:

$$V \sin q_u = W \sin (q_w - q_u),$$
$$u = U \cos q_u + W \cos (q_w - q_u),$$

and

$$K_u = q_u + K - 360°,$$

where U=true wind velocity, q_u=relative direction of the true wind, K_u=true wind direction relative to the northern part of meridian, W=velocity of apparent wind, q_w=direction of apparent, V=speed of vessel and K=course of the vessel. *Subject Headings:* 1. **Anemo-rhumbometers 2. Wind velocity measurement instruments 3. Wind direction instruments I. Solodkov, A. G.**—*I.L.D.*

12.7–288 551.508.72

*Dightman, R. A. (*Weather Bur. Airport Sta., Helena, Mont.*), **Comparison of evaporation from Weather Bureau Class A and Bureau of Plant Industry (BPI) sunken pans, Fort Assiniboine, Montana.** *Monthly Weather Review*, Wash., D. C., 88(3):101–106, March **1960** photo, 10 tables, 8 refs. **DWB, DLC**—Comparative evaporation measurements for both BPI sunken and WB Class A pans at Fort Assiniboine, Mont., for an 8-year period, are reported and are subjected to several elementary analyses which indicate that pan-to-pan ratios determined in one area are not necessarily applicable to any other. The latter point is shown by a comparison of ratios from several widely seperated points in the nation. Comparative pan temps. (maximum, minimum and mean) are also tabulated and discussed. *Subject Headings* **1. Pan evaporimeters 2. Evaporation from pan comparisons 3. Fort Assiniboine, Mont.**—*Author's abstract.*

12.7–289 551.508.72:551.573(439.1

Szesztay, K., **Evaporation pan measurements in Hungary.** *World Meteorological Organization, WMO Bulletin*, 8(4):198–199, Oct. **1959.** 4 refs. **DWB**—A note on the measurement of evaporation by means of a pan in Hungary which started on a large scale during the IGY During 1958 observations were begun at six evaporation stations, thus bringing the total number of stations to nine; three of them having been established from 3 to 6 years ago. In all, it was planned to build up over a period of three or four years a network of 25 to 30 station over the 90,000 sq km of the country. All the stations in the network are being equipped wit two pans, namely a class "A" pan as recommended by WMO, and a sunken pan with a surfac area of 3 sq in. sunk to a depth of 50 cm into the ground. The advantages of this system ar enumerated. *Subject Headings:* **1. Evaporation pan measurement 2. Evaporation measurement networks 3. Hungary.**—*I.S.*

12.7–290 551.508.765:551.501.

Keily, D. P. and Millen, S. G. (*both, M. I. T.*), **An airborne cloud-drop-size distributio meter.** *Journal of Meteorology*, Boston, 17(3):349–356, June **1960.** 13 figs., 2 tables, 20 ref **DWB, DLC**—An air-borne outboard aspirating probe is described which counts and sizes clou droplets in the range two to sixty microns diameter, at rates up to ten thousand per second, b sensing artificial electrostatic charges induced on the particles in proportion to their size Sample observed distributions for a limited number of cloud types are presented. *Subje Headings:* **1. Drop-size distribution meters 2. Cloud droplet distribution.**—*Authors' abstra*

12.7–291 551.508.765:551.574.12:551.576.1

Singleton, F. and Smith, D. J. (*both, Meteorological Research Flight, Farnborough*), **Som observations of drop-size distributions in low layer clouds.** *Royal Meteorological Societ Quarterly Journal*, 86(370):454–467, Oct. **1960.** 6 figs., 3 tables, 17 refs. **DLC, DWB**—12 op samples in ten layers of low cloud of thickness 700–7500 ft (210–2300 m) have been tained using the magnesium-oxide coated slide technique. These observations are discussed terms of the condensation-coalescence mechanism. Comparison has been made between ese observations and a similar set, also obtained by the Meteorological Research Flight, urbin (1959), for convective cloud, from which it is shown that the coalescence process is in eater evidence in the layer clouds. Values of water content deduced from the drop spectra e higher than those previously reported by other workers and correspond in magnitude to e full adiabatic values suitably modified by redistribution within the cloud. Some measureents are also discussed relating to the effect of the aircraft on the representativeness of the op samples. The extension of the magnesium-oxide calibration to drops larger than 100μ ameter has also been examined experimentally. *Subject Headings:* **1. Condensation-coalesnce mechanism 2. Drop size meters 3. Cloud droplets 4. Cloud structure.**—*Authors' stract.*

12.7–292 **551.507.321:551.508.765:551.571.7**

Waters, James L., **Adaptation of an electrolytic water vapor detector for balloon measureent of water content of the atmosphere.** Waters Associates, Framingham, Massachusetts, ontract AF 19(604)-5464, Final Report on Phase 2, April **1960.** 10 p. 2 figs., eqs.—The laptation of an electrolytic water vapor detector for the measurement of water content in the mosphere between 6 and 16 km is described. The instrument is designed for balloon operaon. A discussion outlines present limitations of the instrument and how its performance can improved. *Subject Headings:* **1. Electrolytic water vapor detectors 2. Balloon measureent of water content of atmosphere 3. Water content of atmosphere measurement techques.**—*Author's abstract.*

12.7–293 **551.508.77:551.577.1/2**

Bergeron, Tor (*Royal Univ. Uppsala, Uppsala, Sweden*), **Operation and results of 'Project luvius.'** *American Geophysical Union, Geophysical Monograph,* No. 5:152–157, **1960.** figs. **DWB, DLC**—Using an inexpensive automatic rain gage, Pluvius, the author studied e real distribution of rainfall. As early as 1953, 150 stations were set up and eventually 00 stations participated in Project Pluvius to study the mechanism of precipitation. Two ojects conducted in the vicinity of Uppsala, Sweden, are described and the difficulties in awing conclusions about the mechanism are explained. In both orographic influences seem be effective. One represents a case of the convective cell mechanism and the other a case the stationary lee-wave mechanism. Charts of the orographic rainfall maxima and minima r two successive nights are included. Stability and instability patterns of rainfall are shown a meso-scale network between Lake Vänern and Lake Vättern. *Subject Headings:* **1. Project luvius 2. Rain gages 3. Orographic influences on rainfall distribution 4. Sweden.**—*E.Z.S.*

12.7–294 **551.508.77**

France. Météorologie Nationale. Centre Technique et Mécanique, **Détecteur avertiseur de précipitations, type Météorologie Nationale.** [Precipitation warning detector, étéorologie Nationale type.] *La Météorologie,* Paris, Ser. 4, No. 56:367–369, Oct./Dec. **1959.** f. **DWB**—The precipitation-warning detector permits the instantaneous awareness of the eginning or ending of solid or liquid precipitation inside the station. This instrument is omposed of a conducting grid divided into two parts situated in a horizontal plane, insulated om each other and formed by cylindric strips, connected with an electric circuit. When a ater drop, a snowflake or a hailstone falls on the grid, a contact is established between two ljoining strips and the luminous or sonorous warner inserted in the circuit starts fuctioning rough the instrumentality of relays and appropriate electrical devices. A description of the ain parts of the apparatus and a diagram facilitating the understanding of its functioning e given. *Subject Heading:* **1. Precipitation warner.**—*A.V.*

12.7–295 **551.508.77:546.41:546.13**

Heigel, K. (*Hohenpeissenberg*), **Die Verminderung des Niederschlagsvolumens bei Ionatstotalisatoren bei Verwendung von Chlorcalciumlösung.** [Reduction of the volume of precipitation in monthly totalizers in using a calcium chloride solution.] *Meteorologisch* *Rundschau*, Berlin, 12(5):162–163, Sept./Oct. **1959.** fig., ref. **DWB, DLC**—Results fro three tests show that although the differences in the concentration of calcium chloride solutio produce noticeable differences in the reduction of volume as the amount of precipitation increases, the amount of concentration of the solution loses its significance. At 250 mm bot 5 l and 10 l curves approach closely; the difference between them decreases and the trend o the curves is toward unification. *Subject Headings:* **1. Precipitation totalizers 2. Calciu chloride in precipitation totalizers.**—*E.Z.S.*

12.7–296 **551.508.77**:551.577.3:551.58

Oliver, J., **Rainfall variations over a small area.** *Meteorological Magazine*, London 88(1048):289–293, Nov. **1959.** fig., 4 tables, 2 refs. **DWB, DLC**—A grid of 6 standard 8-in diameter, nonrecording gages was set up to examine the variation of rainfall over a small are and to test the use of a single rain gage to represent the rainfall of a locality. A self-recordin gage was also established to give the duration, time of fall, and character of rain. 104 reading were made between April 25 and Dec. 13, 1956. Frequency of highest and lowest fall, standar deviation and coefficient of variation, calculated for each daily set of 6 readings are reported The details of the relationship to duration and total of fall is presented and the relationship o rainfall totals to variability of readings is tabulated. Rainfall intensity, wind force and direction are discussed. In conclusion it is reported that in relation to rainfall totals, daily period showed larger differences between gages than means for longer periods. The observations als do not invalidate the practice of basing regional rainfall contrasts upon single representativ gages. Some comments by A. Bleasdale on this paper, as well as on an earlier paper by L. H Watkins, are included. *Subject Heading:* **1. Rain gages.**—*I.S.*

12.7–297 551.508.7

Poncelet, L., **Comparison of raingauges.** *World Meteorological Organization, WM Bulletin*, 8(4):186–190, Oct. **1959.** 2 figs., table, 3 refs. **DWB**—Because of lack of homogeneity in the methods of measuring precipitation, the Executive Committee of CIMO decide at its ninth session to adopt an interim international reference precipitation gage and to reques members to install at least one of these gages at an observatory with a view to establishin reduction factors for the various types of instruments used in their national observing network After various considerations, the Snowdon type rain gage of the British Meteorological Office with an alter shield was approved. A diagram of the complete equipment is included. Th paper also discusses the purpose of precipitation comparisons and presents results of some recen comparisons. Annual coefficients of various types of rain gage are tabulated. A photograp showing rain gage comparisons at the Institut Royal Météorologique at Uccle is also included *Subject Headings:* **1. Rain gage comparisons 2. Snowdon rain gage.**—*I.S.*

12.7–298 **551.508.77**:551.57

Rose, C. W. (*Makerere Univ. College, Uganda*) and Farbrother, H. G. (*Empire Cotto Growing Corp., Uganda*), **A method of obtaining average bearing and incidence of rainfall** *Royal Meteorological Society, Quarterly Journal*, 86(369):408–411, July **1960.** 5 figs., 3 refs. eq. **DWB, DLC**—Three tilted rain gages are symmetrically disposed round a vertical axis with their collecting openings facing outward at an angle of 45° to the horizontal. From th ratios of the catches the mean direction of travel of a rainstorm can be estimated, and also th ratio of horizontal to vertical velocity of raindrops, provided it is less than unity. A Namulonge, Uganda (17 mi N of Kampala), between Sept. 1954 and May 1956, the mos common direction of rainfall was from the south, in the sector 150° to 210°, and the velocit ratio exceeded tan 10° for 90% of the total rain. *Subject Headings:* **1. Rainfall bearing an incidence determinations 2. Tilted rain gages 3. Namulonge, Uganda.**—*Authors' abstract.*

12.7–299 **551.508.824**:551.57

Syĭko, A. A. and Danilin, A. I., **O kompleksnoĭ avtomatizatisii gidrometeorologicheskik izmereniĭ.** [Complex automation of hydrometeorological measurements.] *Meteorologiia Gidrologiia*, Leningrad, No. 3:44–45, March **1960.** **DWB, DLC**—Latest developments i ydrometeorological instruments, operated with electronics, telemetry and automatics are riefly described. Special attention is given to the development of the distant automatic pparatuses for the observing, recording and transmitting of the data on the meteorological ements such as atmospheric pressure and temperature, wind velocity and direction, solar diation, precipitation, sea-levels, waving, sky transparency, density of clouds and meteoro- gical data changing with the altitude and many other factors. The possibility of creating combined automatic meteorological station, operated with distant sub-stations and posts, hich can be switched to the station of any locality for essential meteorological and other formation was also discussed. The discussion also includes some objections on elimination f number of experienced operating personnel due to automation. However, the operation nd adjustment of the complicated system of automatic stations will require a large number f experienced personnel. *Subject Headings:* **1. Hydrometeorological measurement devices Automatic hydrometeorological operations 3. U.S.S.R.**—*N.P.S.*

12.7–300 **551.508.952:551.510.534**

Vassy, Arlette and Rasool, S. I., **Un appareil simple pour la mesure rapide de l'épaisseur éduite de l'ozone atmosphérique.** [Simple apparatus for the rapid measurement of the educed thickness of atmospheric ozone.] *Journal de Mécanique et de Physique de l'Atmosphère,* aris, Ser. 2, 1(3):109–117, July/Sept. **1959.** 8 figs., 3 refs. French, English and Spanish ummaries p. 109. **DWB**—Description of a simple apparatus, with filters and a photoelectric ell, for rapid measurement of the total atmospheric ozone. Its principle, mounting, method f calibration and functioning are described and the results obtained are compared with those iven by a Dobson spectrophotometer. The precision of the measurements is of the order of %. Since the instrument is extremely simple, light and portable it is particularly suitable for eld measurements. *Subject Headings:* **1. Ozonesondes 2. Atmospheric ozone measuring evices.**—*Authors' abstract.*

12.7–301 **551.508.952:551.510.534**

Vassy, Arlette and Rasool, I., **Répartition verticale de l'ozone atmosphérique à différentes titudes.** [Vertical distribution of atmospheric ozone at various latitudes.] *Annales de éophysique,* Paris, 16(2):262–263, March/June **1960.** 3 refs. **DLC**—Comparison of several eterminations of vertical ozone distribution made by means of a special radiosonde in various egions located at very different latitudes. This direct method by ascent of the measuring evice is the only one that might indicate, with certainty, the frequency of compound distributions, i.e., the distribution above the principal maximum of a second and even a third maximum. hese cases are more frequent at middle latitudes. It seems that in Adélie Land the lower yers do not contain more ozone at high latitudes than at low latitudes. Furthermore, the zone content of the lower layers suddenly increases in the middle of spring. *Subject Headings:* **. Vertical ozone distribution 2. Ozone distribution measurement 3. Ozonesondes.**—*A.V.*

12.7–302 **551.508.98 551.501:551.586:612.79**

King, Erwin (*Tübingen*), **Berechnung von Frigorigraphentemperaturwerten aus meteoro- gischen Messwerten.** [Calculation of frigorigraph temperatures from meteorological easurements.] *Meteorologische Rundschau,* Berlin, 13(1):9–14, Jan./Feb. **1960.** 10 figs., tables, 6 refs., 9 eqs. **DWB, DLC**—The author presents a procedure for obtaining the skin rface temperature measured by the frigorigraph either from the formula or graphically by scertaining the individual meteorological elements in the formation of the frigorigraph tem- erature. Since in the original Büttner formula for the dependence of skin surface temperature $_T$) of the frigorigraph upon environmental factors O_T is expressed implicitly because the ng wave radiation $b \cdot A$ depends upon the surface temperature, it is necessary to transform e Büttner formula for a graphical solution. The formula thus attained is

$$Q = \frac{H + aJ + G_H + A_E}{\chi \cdot \alpha c} + T_L |{}^\circ\mathrm{C}|$$

here Q=surface temperature, H=advected heat ($g\ cal/cm^2 min_1$) a=absorption constant, =short wave radiation of sun, sky and clouds ($g\ cal/cm^2 min_1$), G_H=counter radiation of the atmosphere ($g\ cal/cm^2min_1$), A_E=long wave radiation of the ground surface ($g\ cal/cm^2min$), $\chi\cdot\alpha$=wind factor, which also contains the convection portion ($g\ cal/cm^2min$ °C) and T_L=air temperature (°C). The procedure for determining the short wave radiation balance and long wave radiation balance of the frigorigraph and the consideration of the wind factor are presented. The final computation equation obtained is

$$Q=\frac{0.60[0.267+\bar{J}_s(1+2\cdot R\sin h)+\bar{J}_H(1-B)\cdot(1+R)+W\cdot B\cdot F_W(1+R)]G_H\cdot W_F+A_E+T_L}{\chi\cdot a_v}|°C|$$

where R=reflection coefficient of incoming short wave radiation at the ground, h=solar altitude, B=amount of cloud cover, J_s=short wave incoming radiation of the sun, J_H=short wave radiation of the sky, F_W=transmission for different cloud types, W=radiation of cloud cover, W_F=factor for determining counter radiation of cloud cover. The wind factor is given by $\chi\cdot a_v=0.008+0.020\cdot\sqrt{v(m/sec)}\left[\frac{cm^2\cdot min°C}{g\ cal}\right]$. The testing of the procedure and the validity and application of the formula are discussed. *Subject Headings:* **1. Frigorigraphs 2. Skin surface temperature measurements.**—*I.L.D.*

SYNOPTIC ANALYSIS AND FORECASTING (551.509)

See also: **Snow removal in mountain passes** (Stackhouse), 12.7–114; **Vertical and horizontal motion of perturbations** (Raethjen), 12.7–384; **Use of monthly mean CLIMAT charts** (Lamb, Johnson), 12.7–425; **Records of atmos. elec. field near earth's surface** (Ralt, Tollner), 12.7–453.

12.7–303 **551.509.31**:**551.515.13**:**551.515.4**(47)

Iakovlev, B. A., **Zimniaia groza v Murmanske.** [Winter thunderstorm in Murmansk.] *Meteorologiia i Gidrologiia,* No. 12:34–35, Dec. **1959.** fig. **DWB, DLC**—The synoptic conditions preceding and during the thunderstorm, observed at 5:50 a.m. on Dec. 12, 1957 in the vicinity of Murmansk are discussed with details and in regard to the trajectory of a cyclone marked on the map of the Barents Sea. Considerable lowering of temperature (−16°C) near the ground was observed on the evening of Dec. 11 with light wind and clear sky. During the night the snow began to fall, accompanied by squalls up to 28 m/s velocity, which considerably changed the synoptic situation in the regions of Murmansk and Novaya Zemlya. Many small "snow static discharges" were recorded by the radio before two severe lightning flashes and thunder claps occurred. *Subject Headings:* **1. Winter thunderstorms 2. Synoptic case history studies 3. Murmansk, Murmansk Region, U.S.S.R.**—*N.P.S.*

12.7–304 **551.509.31**:**551.558.1**:**551.515.8**:**551.577.21**(47

*§Vetlov, Ivan Pavlovich and Petrenko, N. V., **Osadki kholodnykh frontov v tsentral'no chasti Evropeĭskoĭ territorii SSSR v teploe vremia goda.** [Cold front precipitation in central European U.S.S.R. during the warm period of the year.] Leningrad, Gidrometeoizdat, 1955 63 p. 19 figs., 10 tables, 11 refs. At head of t-p.: Glavnoe Upravlenie Gidrometeorologichesko Sluzhby pri Sovete Ministrov SSSR, Tsentral'nyĭ Institut Prognozov. **DLC** (QC925.4.R94V4 —A substantial study of vertical motions in the region of fronts and an analysis of two types of synoptic situations in Central European U.S.S.R.: 1) two cases of fronts moving from the west and 2) another two moving from the NW. A chapter is devoted to the change in intensity of precipitation connected with the evolution of cold fronts, one to the increase in humidity in frontal areas and the final chapter to the orographic influence of the Valdai Hills and the Klinsk-Dmitrovsk ridge on precipitation. The situations analyzed are: 1) June 19–20, 1951 2) June 25–26, 1950, 3) Sept. 21–23, 1949, 4) Sept. 28–29, 1949. Surface, 850 and 700 mb charts are analyzed for each case and shown together with mesometeorological precipitation charts for daytime and nightime, specific humidity charts, and tables giving data on frequency and intensity of precipitation under different frontal conditions. *Subject Headings:* **1. Synoptic case history studies, European U.S.S.R. 2. Cold front precipitation studies 3. Precipitation forecasting studies 4. Vertical motions in frontal areas 5. Orographic influences 6. Central European U.S.S.R.**—*M.R.*

12.7–305 **551.509.311:551.515.83:551.524.37**(477)

*Bialynitskaia, V. G. and Ped', D. A., **Usloviia formirovaniia zamorozkov na Ukraine.** Conditions for the formation of frosts in the Ukraine.] *Moscow. Tsentral'nyĭ Institut rognozov, Trudy*, No. 49:264–288, **1957.** 9 figs., 13 tables, 16 refs. **DLC**—The authors vestigated the climatic characteristics of frost in the Ukraine, in particular atmospheric ost, at the 2 m level in May. The study is based upon aerological, synoptic and statistical aterial for 1938–1954. Some 80 agrometeorological and synoptic stations served to characrize the distribution of frosts in the Ukraine. Frost was recorded when the minimum mospheric temperature at the 2 m level was 0°C and lower. The distribution of frost days r year, of the number of days with frost according to periods and of frost intensity in May d the distribution of natural synoptic periods with frost are summarized and the macronoptic processes favoring frost recurrence in May are established. The occurrence of osts in the Ukraine is associated with a well expressed meridional front with a frontal zone ssing through the Ukraine. At the surface there is established high pressure and cold r of Arctic region with a temperature near 0°C. The forecast of May frost in the Ukraine th the aid of the index of meridional circulation is illustrated with the aid of specific examples d the procedure of frost forecasting is outlined. *Subject Headings:* **1. Frost formation Synoptic case histories 3. Frost forecasting 4. Ukrainian S.S.R.**—*I.L.D.*

12.7–306 **551.509.313:551.542:551.511:551.547**

Sadokov, V. P., **Ob odnom chislennom metode rascheta baricheskogo polia dlia sluchaia roklinnoĭ atmosfery.** [A numerical method of forecasting baric fields for the case of baronic atmosphere.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, 78:105–111, **1958.** ., 4 refs., 20 eqs. **DWB**—The method of computing the pressure field for a baroclinic mosphere is based upon the method of characteristics, i.e., the geopotential field or one of s operators is transported along characteristic curves remaining constant during a small part the forecast period. The final formulas are prepared for calculation on electronic computers. om the initial equation of vortex velocity, of the adiabatic equation written in geostrophic proximations and introducing the linear operator $L=\frac{\partial}{\partial\zeta}\zeta^2\frac{\partial}{\partial\zeta}+m^2\Delta$ there is obtained the uation $\frac{\partial L(\Phi)}{\partial t}=-\frac{1}{l}(\Phi, L(\Phi))$ which describes the variation of the operator $L(\Phi)$ with time a result of the transport of the operator along isolines of the geopotential Φ. The equation r the geopotential ϕ at each step is given by

$$\frac{\partial^2\phi_1}{\partial x_1{}^2}+\frac{\partial^2\phi_1}{\partial y_1{}^2}+\frac{\partial^2\phi_1}{\partial\xi^2}-\tfrac{1}{4}\Phi_1=c(x,y,\xi)$$

th a multiplier $\frac{1}{\sqrt{\xi}}$. The automatic selection of the step with time is accomplished by $=\frac{h}{4|c|\max}$. The computation method for a three level atmospheric model is presented. *bject Headings:* **1. Forecasting pressure fields 2. Numerical forecasting 3. Three level recasting model.**—*I.L.D.*

12.7–307 **551.509.313:551.571:551.509.324**

Shvets, M. E., **K voprosu predvychisleniia polia otnositel'noĭ vlazhnosti.** [The problem predicting the relative humidity field.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, udy*, No. 81:3–12, **1959.** fig., table, 4 refs., 21 eqs. **DLC**—The determination of conditions at are either favorable or unfavorable to the condensation of water vapor involves answering e question whether the air attains a state of saturation and the length of the duration of this ate. In investigating the conditions of formation and evolution of cloudiness by the methods dynamic meteorology, it is necessary to use the equation of transport of relative humidity moisture deficit as that moisture deficit can be forecast directly. The derivations of these uations from the equations of transport of absolute humidity and heat advection are presented. juations are developed for determining the intensity of "runoff" of water vapor, the influence of ascending air currents upon the origin or dissolution of clouds, the effect of vertical currents associated with orography on the formation of stratified clouds and the influence of advected heat upon the formation of precipitation, the advection of moisture being neglected. *Subjec Heading:* **1. Relative humidity forecasting.**—*I.L.D.*

12.7–308 **551.509.5:551.515.127**

Piatygina, K. V. and Emel'ianova, M. Z., **Rezul'taty predvychisleniia peremeshcheni nazemnykh tsentrov tsiklonov.** [Results of precalculations of the displacement of the surfac centers of cyclones.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 81:34–35 **1959.** 3 figs., 6 tables, 4 refs. **DLC**—The authors verify the method of forecasting the displacement of surface cyclones and the conclusions derived on the basis of this method in the study of K. V. Piatygina and M. N. Zakhorova *Leningrad. Glavnaia Geofizicheskai Observatoriia*, (*Trudy*, No. 71, **1957**). The earlier conclusion that the displacement of high and medium altitude cyclones should be forecast on the basis of initial average data is confirmed Also the predicted displacement is, on the average, larger than the actual displacement. The empirical convection coefficient computed from the mean geometrical magnitude of the rati of the forecast to the actual displacement should be increased from 0.7 to 0.85. The deviations in direction of displacement are analyzed and it is shown that their exclusion by compensatio increases somewhat the validity of the method. With respect to direction and vector of displacement the method gives poorer results for deepening than filling cyclones. The earlie accepted systematic deviation of 7° is valid in practice for both deepening and filling of high and medium altitude cyclones. A comparison of the thermodynamic method, based o calculation of geostrophic deviation, with the method of tendencies shows that the forme gives better results for both high and medium altitude cyclones. In the case of low altitud cyclones the method of tendencies gives better results. Data on the validity of forecasts o displacement of cyclonic centers, of high and medium altitude cyclones, of centers of deepenin and filling cyclones, and of low centers are presented in an appendix. *Subject Headings* **1. Forecasting displacement of surface cyclones 2. Forecast verification data 3. Forecas accuracy.**—*I.L.D.*

12.7–309 551.509.56:551.515.4:551.43(479

Guniia, S. U., **Metodika prognoza groz v gornykh usloviiakh Zakavkaz'ia.** [Method o forecasting thunderstorms under mountain conditions in Transcaucasia.] *Tiflis. Nauchno Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 4:18–37, **1959.** 14 tables, 14 refs **DWB**—The role of mountain ranges in the formation and development of intramass thunderstorms over Transcaucasia is discussed and the vertical components of wind velocity at th mean level of the troposphere produced by the influence of the Caucasus Mountains are show to be computed by means of the equation

$$w=\frac{0.079}{\pi}\left(\frac{\partial \ln \pi}{\partial x}\frac{\partial \tilde{\psi}}{\partial y}-\frac{\partial \ln \pi}{\partial y}\frac{\partial \tilde{\psi}}{\partial x}\right)=\frac{0.079}{\pi}\,(\ln \pi, \tilde{\psi})$$

where $\pi=\dfrac{P_\zeta}{P_0}$ = ratio of atmospheric pressure at the level of the mountains to its value at se level, ψ = stream function which in an undisturbed air current, is determined by $\tilde{\psi}=xv_0-yu$ where u_0 and v_0 = horizontal components of wind velocity (considered guess). On the basis o 700 mb topography charts for 1951–1953 the atmospheric circulation processes over th Caucasus, producing thunderstorms, were classified into six principle types each with subtypes. The distribution of the number of days with thunderstorms according to types of circulatio processes, the types of circulation processes furthering and not furthering intramass thunderstorms, etc. are discussed and numerical data are presented. This is followed by a consideration of the significance of atmospheric humidity in the formation of intramass thunderstorm and the role of atmospheric temperature in the formation and development of intramas thunderstorms in Transcaucasia; a description of the method of constructing a forecastin emagram for the moment of maximum warming of the atmospheric layer adjacent to th earth; the preparation of a forecast of intramass thunderstorms and forecasting frontal thunde rms under the mountain conditions of Transcaucasia. *Subject Headings:* **1. Forecasting nderstorms 2. Atmospheric circulation types 3. Transcaucasia, U.S.S.R.**—*I.L.D.*

12.7–310 551.509.58:551.326.7(262.5)

Khesina, B. G., **Sinopticheskie usloviia zamerzaniia Azovskogo moria.** [Synoptic condi- ns during the freezing of the Sea of Azov.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy,* 29–50, **1958.** 14 figs., 3 tables, 6 refs. **DWB**—Formating and sustaining of ice in the llow water of the Sea of Azov are discussed in regard to the thermal conditions along the re line. The forecasting of ice formation is based on the meteorological data for air, tribution of water temperature, thermal conductivity of water and other synoptic processes. erefore, the conditions of freezing at various parts of sea are studied on 14 maps, indicating synoptic processes, distribution of anomalies in air temperatures, AT_{500} tendency, isohypses, . As the result of analysis ten freezing factors are considered, among which are: (1) freezing ound directly affected by action of the atmospheric processes, (2) timing of freezing is dually distributed on three regions of the sea, (3) the character of the synoptic process is uliar to each region, (4) freezing occurs at the end of each period. Other factors concern specific details of synoptic processes in different regions. *Subject Headings:* **1. Forecasting formation 2. Synoptic conditions for ice formation 3. Sea of Azov, U.S.S.R.**—*N.P.S.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

ATMOSPHERIC COMPOSITION (551.510.4)

12.7–311 551.501.71:551.510.41:546.264

Fonselius, Stig and Wärme, Karl-Erik (*both, Internat. Met. Inst., Stockholm*), **A method nake standard CO_2 samples for infrared gas analysis and the operation of an IRGA analyser air samples from the Scandinavian network.** *Tellus*, Stockholm, 12(2):227–230, May **1960.** gs., table., ref. **DWB, DLC**—A method of making CO_2 standard gas mixtures varying ween 1 and 400 ppm in concentration with an accuracy of ±1 ppm is described. An ac- ately known volume of pure CO_2 gas is mixed with CO_2 free dry air in an evacuated vessel. nethod to take samples from this vessel and to analyze the samples in an IRGA gas analyzer described. The use of the apparatus for the Scandinavian CO_2 network is described. *ject Headings:* **1. Carbon dioxide measurement techniques 2. IRGA gas analyzer Scandinavia.**—*Authors' abstract.*

12.7–312 551.510.42:711.4(421)

Beriushev, K. G., **Voprosy planirovki i zastroĭki gorodov i okhrany atmosfernogo vozdukha nglii.** [Problems of planning and building of cities and air pollution control in England.] *iena i Sanitariia*, Moscow, Vol. 23(7):72–80, July **1958.** 3 figs. **DLC**—This is a report by nember of the Soviet delegation to the International Congress on Public Health held in 1957 Folkstone, Eng. Some of the more important papers delivered on air pollution and city nning at the congress are summarized and observations on the control of air pollution and n planning made in England are presented. The papers mentioned include the following: **planning and industrial location** by Peter Stock; **Atmospheric pollution and the need for okeless fuel,** by I. D. P. Woodall, etc. The author describes the research at the central stations in London, methods of air pollution studies including collection of air samples, ermination of dust dispersions, precipitation of dust by electrostatic means, sulfuric acid taminants in the atmosphere, studies on masks to be provided for the general population, lical aspects of air pollution investigated at the National Institute of Medical Research, etc. planning and housing in the London suburbs of Crawley and in Folkstone are described. *ject Headings:* **1. Atmospheric pollution control 2. City planning 3. London, Eng.**—*I.L.D.*

12.7–313 551.510.42:551.551:551.43

Hewson, E. Wendell (*Civil Eng. Dept., Univ. of Mich., Ann Arbor*), **Effects of topographic meteorological conditions on distribution of air pollutants.** (In: National Conference on Pollution, Wash., D. C., Nov. 1958, **Proceedings,** pub. **1959.** p. 106–109.) **DWB** (M10.42

N277pr)—The discussion is divided into two parts. The first part of the paper is a ver general review of meteorology in relation to distribution of air contaminants. Wind is the mos important weather element in the diffusion of air pollutants. Both wind speed and win direction are considered to explain the distribution process. The effect of precipitation, sola radiation, and topography is also discussed in this section. The second part consists of a brie list of suggested areas in which meteorological investigations could be pressed mor energetically. *Subject Headings.* **1. Wind effects on atmospheric pollution 2. Orographi diffusion patterns.**—*I.S.*

12.7–314 551.510.42:551.524.

Munn, R. E. (*Dept. Transport, Canada*) and Katz, Morris (*Dept. of Natl. Health an Welfare, Canada*), **Air-pollution levels associated with a 49-hour inversion at Detroit-Windso** *American Meteorological Society, Bulletin*, 41(5):245–249, May **1960.** 6 figs., table, 6 ref **DWB**—During the period Dec. 27 to 29, 1958, the Detroit-Windsor area experienced a pro longed inversion. Winds were light, visibility was poor, and air pollution levels were hig The circumstances surrounding the event are described on both the synoptic and the mes scales. The broad features, a stationary ridge of high pressure and a light southeast gradien of stable air, fit the classical inversion picture. However, there are interesting small-sca details. In particular, a cooling at 300 ft on the morning of Dec. 29th is described and shown to be consistent with other available data including observations from a 100 ft tower a Lagoona Beach, Mich. *Subject Headings.* **1. Atmospheric pollution 2. Inversion effects o atmospheric pollution 3. Detroit, Mich. 4. Windsor, Ontario, Canada.**—*Authors' abstract.*

ATMOSPHERIC POLLUTION (551.510.42)

See: **Aerodynamic capture of particles** (Richardson, *ed.*), 12.7–1; **Freezing nuclei anomalies** (Kline, Brier), 12.7–399; **Freezing nuclei from ind. processes** (Telford), 12.7–402.

12.7–315 551.510.42:546.2

West, Philip W. (*Louisiana State Univ.*) and Gaeke, G. C., Jr. (*Kem-Tech Lab., Louisiana* **Determination of sulfur dioxide in the atmosphere, (summary only).** *American Geophysic Union, Geophysical Monograph*, No. 3:43–44, **1959. DWB, DLC.** Note: The paper repre sented by this summary has been pub. under the title: **Fixation of sulfur dioxide as disulfito mercurate (II) and subsequent colorimetric estimation,** *Analytical Chemistry*, Wash., D. C 28:1816–1819, **1956. DLC**—Sulfur dioxide in the atmosphere may be absorbed quantitativel by scrubbing through dilute (0.1 M) sodium tetrachloromercurate (II). Stable, non-volati disulfitomercurate (II) is formed. The reaction is rapid, and relatively high sampling rat may be used (as high as 10.1 per min). The determination is based on the red-violet col produced when hydrochloric acid bleached p-rosaniline (0.04% dye in 6% acid) and forma dehyde (0.2%) are added to the sampling solution. Color formation is fairly rapid, reachin maximum absorbancy in twenty minutes. The absorption maximum is at 560 mμ and th color is temperature-independent and stable for several hours. The only common interferen is nitrogen dioxide which causes a slight decrease in color intensity. The method has bee compared with several other methods and field results indicate that consistently higher resul are obtained with the disulfitomercurate method. The peroxide method was not compare because it measures sulfates and sulfur trioxide as well as sulfur dioxide. The new metho has been found to be very sensitive (less than one microgram may be detected) and has bee proven to be very useful in the absolute determination of sulfur dioxide in community a pollution surveys. *Subject Headings:* **1. Sulphur dioxide in the atmosphere 2. Atmospher pollution studies.**—*Authors' abstract.*

TROPOSPHERE (551.510.52)

See: **Fourth summary report of Boulder Labs.,** 12.7–8; **Wind analysis in the tropics** (Tang), 12.7–241; **Balloon obs. of artificial radioactivity** (Mantis, Winckler), 12.7–269; **Comparison of mean temp. of the troposphere with temp. at 500 mb level** (Makhover), 12.7–370; **Records of atmos. elec. field near earth's surface** (Rott, Tollner), 12.7–453.

TROPOPAUSE (551.510.528)

12.7–316 551.524.77:551.510.528

Slobodov, B. Ia., **Izmeneniia vertiakal'nykh gradientov temperatury i kolebaniia vysoty opopauzy.** [Changes in the vertical temperature gradient and fluctuations of the height of e tropopause.] *Meteorologiia i Gidrologiia*, Leningrad, No. 3:41–43, March **1959.** 4 refs., eqs. **DWB, DLC**—The oscillations of the height of the tropopause are explained by the sumption that the velocity of movement of the tropopause coincides with the velocity of flow, but the observational results do not confirm this assumption. The tropopause may be splaced in a direction opposite to that of vertical air movement which excludes any subantiality. One of the causes of the variation of vertical temperature gradients is turbulent at exchange and radiant heat transport. Hence these factors may cause a considerable atification near the tropopause. This paper deals with the adiabatic factors of the variation vertical temperature gradients and hence with the fluctuations of the tropopause. From e equation of advection of heat in the form $\frac{dT}{dt}-\frac{A}{c_p\rho}\frac{dp}{dt}=0$ is derived the equation for the y adiabatic gradient in vector form $\frac{\partial\gamma}{\partial t}=(\bar{v}, \text{grad}\ \gamma)-\frac{\gamma_a}{T}(\bar{v}, \text{grad}\ T)-\frac{AR}{c_p}\left(\frac{\gamma_a-\gamma}{p}\right)\frac{\partial p}{\partial t}$ $\frac{\gamma_a{}^2w}{T}+(\gamma_a-\gamma)\frac{\partial w}{\partial z}$. The analysis shows that local variations of vertical gradients during iabatic processes occur as a consequence of advection of vertical temperature gradients, vection of temperature, local pressure variation, vertical movements, and dependence of rtical velocity upon height. The author analyzes the oscillation of the height of the tropouse during adiabatic processes under the influence of these causes. *Subject Headings:* **Vertical temperature gradient 2. Tropopause height correlations.**—*I.L.D.*

12.7–317 551.510.528:551.547.5

Sugimoto, Y. and Ono, K., **The arrangements of tropopause and the estimated values of ickness between 200 mb and 300 mb levels.** *Journal of Meteorological Research*, Tokyo, (3):125–130, March **1960.** 4 figs., 4 tables, 2 refs. In Japanese; English summary p. 125. **VB, DLC**—For the purpose of investigating the arrangements of tropopause, the ascent rves in winter, (e.g., in Jan. 1957) at Shionomisaki and Wakkanai were classified into 5 types. ere were 25 days with the observation of double tropopause in one month at Shionomisaki. e height of the lower tropopause is 310 mb on the average with a thickness of 60 mb. The se rate between the lower tropopause (middle latitude tropopause) and the upper tropopause opical tropopause) is 0.47°C/100 m on the average, a fairly small value compared with that the standard atmosphere. The distribution of tropopause was also examined on the basis upper air chart on broad scale and aerological data on Jan. 30, 1958 to know the arrangeents and heights of tropopause. Based on the above results, we established the relationship tween 300 mb temperature and 200∼300 mb thickness by arranging statistically about 800 ses of the observations in winters and summers of 1957 and 1958. *Subject Headings:* **1. Tropouse height correlations 2. Upper air charts 3. Shionomisaki, Japan 4. Wakkanai, Japan** *Authors' abstract.*

STRATOSPHERE (551.510.53)

See also: **Aerodynamics of upper atmos.** (Masson, *comp.*), 12.7–5; **Reversal of stratospheric winds, N. America** (Belmont), 12.7–6; **Ozone obs., Little America** (Wexler et al.), 12.7–35; **Empirical study of vertical velocities** (Epstein), 12.7–237; **Vertical velocities in upper troposphere and lower stratosphere** (Orlova), 12.7–240; **Rapid measurement of reduced thickness of atmos. ozone** (Vassy, Rasool), 12.7–300; **Vertical distribution of atmos. ozone** (Vassy, Rasool), 12.7–301.

12.7–318 551.510.53:551.524.72:551.557.2

*Panofsky, Hans A. (*Pa. State Univ.*), **Review of the distribution of wind and temperature the lower stratosphere.** *Institute of the Aeronautical Sciences. IAS Paper* No. 60-25, **60.** 20 p. 10 tables, 11 refs. **DWB** (M:629.13 I59pa).—The stratosphere, between the popause and about 100,000 ft may be subdivided into two layers; a lower layer which is characterized, except near the winter pole and in the tropics, by westerly winds which decreas in intensity upward and an upper layer in which the winds increase in intensity upward. Th boundary between these two layers is, on the average, at about 65,000 ft in summer and 80,00 ft in winter. In the lower part of these layers, not only the mean speed but also the intensit of troughs and ridges decrease upward in intensity; these features are, in fact, somewhat feebl and smoothed replicas of the tropospheric systems immediately below. A major exceptio exists around the pole where a cold cyclonic vortex is located which increases in intensity upwar quite rapidly. The upper layer generally contains systems which increase in strength as on moves upward and is more nearly independent of tropospheric configurations. Here, ther exists a seasonal reversal of wind direction between the tropics and the pole; westerlies in th winter and easterlies in the summer. Correspondingly, there exists a large temperatur variation at the poles, from about −75°C in winter to −35°C in summer. In general, th movements and development of stratospheric systems are extremely slow; persistence i generally the best forecast technique. However, in northern latitudes in winter relativel rapid and profound changes may occur between December and the end of March. Durin this period, warming by as much as 45°C in 2 days may be observed, occurring the first a 100,000 ft and gradually spreading downward. Anticyclogenesis at high levels accompanie the increase in temperature. This warming is rapid enough to deserve the term "explosive warming. The rate of warming is much greater than the cooling at the beginning of the winte season. *Subject Headings:* **1. Stratospheric systems 2. Stratospheric warming.**—*Author' abstract.*

12.7–319 551.510.53

Gebbie, H. A.; Stone, N. W. B. (*both, Natl. Physical Laboratory, Teddington*) and Walshaw C. D. (*Cavendish Laboratory, Cambridge*), **Pure rotational absorption of ozone in the regio 125–500 microns.** *Nature*, London, 187(4739):765–767, Aug. 27, 1960. 2 figs., 4 refs. **DWE DLC**—Pure rotation spectra of gaseous ozone have been recorded in the laboratory for th wave-length 125–500μ. A description of the instrumentation and an analysis of the result is given. It is confirmed that Q branches are observed near 22 cm^{-1} and 28 cm^{-1} in the laboratory spectra and this makes plausible the suggestion that unidentified features in the sola spectrum could be attributed to ozone in the upper atmosphere. *Subject Headings:* **1. Ozon spectra 2. Ozone in upper atmosphere.**—*R.B.*

RADIO METEOROLOGY (551.510.62)

See: **Fourth summary report of Boulder Labs.**, 12.7–8; **Measurement of antenna gain** (Cottony), 12.7–120; **Long-distance single F-hop transmission** (Dieminger et al.), 12.7–123; **Long-distance ionospheric propagation** (Gerson), 12.7–124; **Ionospheric absorption** (Lansinger), 12.7–156; **Integral equations for vertical propagation of time-harmonic plane waves** (Tomlinson), 12.7–157; **VLF spectra of atmospherics** (Obayashi), 12.7–158; **Spectra of atmos. scalars** (Gossard), 12.7–375.

RADIOACTIVITY (551.510.7)

See also: **Items** 12.7–102 to 12.7–104.

12.7–320 551.5:551.510.

*Davis, J. A. (*Univ. of Texas*); Logie, L. C. (*Brooks Air Force Base, Tex.*); Robinson, E. M (*Univ. of Texas*) et al., **A correlation analysis of the relationship between weather and atmospheric radioactivity.** *Health Physics*, N. Y., 4(1):55–61, Oct. **1960.** fig., 7 tables, 8 refs 2 eqs. **DLC.** Also issued as report by the Brooks Air Force Base, Texas, School of Aviatio Medicine, USAF Aerospace Medical Center, Feb. **1960.** 7 p. fig., 7 tables, 8 refs., 2 eqs **DWB** (M10.721 U581co)—Correlation analysis between various surface weather parameter and samples of atmospherically borne radioactive material has been performed. The materia collected was primarily of natural origin (i.e., radon and thoron). Statistically significan correlations exist between wind speed at the time of sampling and between temperature, de point, visibility and the north-south component of the wind vector prior to the time of sampling e analysis suggests that the natural radioactive material is transported into the Austin area thin the turbulence associated with a cold frontal passage and concentrated in the lower air ers by the ensuing elevated temperature inversion. *Subject Headings:* **1. Radioactivity in atmosphere 2. Weather effects on atmospheric radioactivity. I. Heathington, B. S.**—*thors' abstract.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE (551.511)

See also: **Large scale atmos. circulation,** 12.7–4; **Net exchange of radiation from vegetation** (Decker), 12.7–92; **Convective precip.** (Clark), 12.7–249; **Convective processes** (Hitschfeld), 12.7–251; **Numerical assessment of divergence, Singapore** (Bryant), 12.7–271; **Measurements of radiative flux** (Clarke), 12.7–276; **Numerical method of forecasting baric field** (Sadokov), 12.7–306; **Model of atmos. circulation, Antarctica** (Gusev), 12.7–332; **Relation of air mass structure to the field of motion over eastern North Pacific** (Neiburger), 12.7–349; **Heat balance at the ground, Bangui** (Perrin de Brichambaut), 12.7–356; **Thermal excitation of solar semidiurnal tide of earth's atmos.** (Endo), 12.7–374; **Wind profile in thermally stratified flow** (Swinbank), 12.7–390.

12.7–321 **551.511.1:551.513.2**

Okamura, Y., **A study of the stationary meteorological fields of the large scale.** *Meteoro-ical Society of Japan, Journal*, Ser. 2, 37(4):115–123, Aug. **1959.** 2 tables, 8 refs., 42 eqs. panese summary p. 123. **DWB, DLC**—It seems that some solutions of the equation of the tionary motion are useful for the problem of the general circulation. In those cases where vertical variations are small and nonlinear interaction is negligible, it can be solved. Thus solutions of it give us the vertical motion suitable for the explanation of the cells of the ridional circulation and also give us the westerly flow patterns of the large scale motion alitatively. But in its quantitative aspect the difficulty is that easterly wind near the lator cannot be explained and upper westerly jet is computed as somewhat weaker. If the egral constants are determined so as to fit at equator, then it appears that the area where solute vorticities are negative, it becomes impossible to cover all over the earth with unit cular solution as obtained here. *Subject Headings.* **1. Atmospheric circulation 2. Large le circulation 3. Meridional circulation.**—*Author's abstract.*

12.7–322 **551.511.13:551.511.6:551.521.32**

Goody, R. M. (*Harvard University*), **The influence of radiative transfer on the propagation a temperature wave in a stratified diffusing atmosphere.** *Journal of Fluid Mechanics,* ndon, 9(3):445–454, Nov. **1960.** 2 figs., 3 tables, 13 refs., 39 eqs. **DWB, DLC**—An proximate solution is presented to the problem of the propagation of a temperature wave ough a stratified medium which both diffuses and radiates heat. The solution is a combina-n of two waves whose relative amplitudes vary with the distance from the lower boundary. parent diffusivities computed from phase lag and attenuation coefficients can differ greatly m each other and can vary with height even if the actual diffusivity does not. An example, ng parameters simulating the earth's atmosphere, suggests that analysis of the propagation the diurnal wave upward from the earth's surface is likely to be inadequate if radiative ects are not considered. *Subject Headings.* **1. Thermodynamics 2. Radiative transfer of at.**—*Author's abstract.*

12.7–323 **551.511.2:551.515.71**

Riehl, Herbert (*Univ. Chicago*), **On production of kinetic energy from condensation ating.** (In:Bolin, Bert (*ed.*) **The atmosphere and the sea in motion.** N. Y., Rockefeller titute Press, **1959.** p. 381–399. 28 figs., 5 tables, 13 refs., 10 eqs.) **DLC**—Warm anti-lones extending to the high troposphere are usually regarded as "dynamic" anticyclones. this paper a situation is presented where a warm high was of thermal origin, produced and intained by release of latent heat of condensation. The interior of the high was filled with ud and rain; maximum precipitable water content of the air was found in the central parts the high. This situation occurred over the Gulf of Mexico and the southeastern United

States during Sept. 1957. It is now known that this type of circulation occurs fairly frequentl in subtropical and tropical latitudes. Therefore, the warm thermal high should be added t the types of disturbances known to exist in the atmosphere. Such a high affords simple dire means for converting latent heat energy to potential and then to kinetic energy. Calculation of the energy budget of the high showed that over the four days analyzed, there was litt export or import of heat through the boundary. A gradual increase in the intensity of th system was produced by an excess of local heat source at the ocean surface over net outgoir radiation. The warm thermal high is associated with a "direct" mass circulation: inflow an convergence near the surface, outflow with divergence near the top. From vorticity an balanced wind considerations low pressure should develop at the surface underneath the war high, and this took place. Thus the mass circulation was directed everywhere toward low pressure; it released potential and produced kinetic energy. A large export of kinetic energ took place through the boundaries of the system, manifested by formation of two jet stream on its northern and eastern peripheries. *Subject Headings:* **1. Kinetic energy in anticyclon 2. Kinematics 3. Circulation types.**—*Author's abstract.*

12.7–324 551.511.3:551.58:551.4

Kurihara, Y. (*Met. Res. Inst., Tokyo*), **The dynamical aspects of the climate in the low atmosphere near the large scale mountains: Rocky Mountains region in winter.** *Meteorologic Society of Japan, Journal*, Ser. 2, 37(6):234–257, Dec. **1959.** 20 figs., 2 tables, 13 refs., ed Japanese summary p. 257. **DWB, DLC**—In Sec. 3, wind speed in the vicinity of mountains shown to be small. The role of Rocky Mountains as a barrier to the mean eastward curre is also made clear. A pattern of air flow over mountains in a vertical cross section along zon direction is presented. The mean state of balance among the force due to pressure gradie Coriolis force and the force by Reynolds stress and friction is presented in Sec. 4. The influen of friction on mean air flow is evident near the lower boundary of the atmosphere. The rat of mean actual wind speed to the mean geostrophic one is 81 to 88%, except near the groun surface. It was impossible to find a certain value as an Austausch coefficient in a shallo layer on the land, though it was about 10^5 C.G.S. at many places. In Sec. 5, it was found th the lower atmosphere in the Rocky Mountain region was a source of kinetic energy as well of available potential energy. *Subject Headings:* **1. Dynamic meteorology 2. Large sca vertical motion 3. Orographic influences 4. Rocky Mts., U. S.**—*Author's abstract.*

12.7–325 551.511.33:551.513.2:551.557

Danielsen, Edwin F. (*Univ. Wash., Seattle*) and Reiter, E. R. (*Univ. Innsbruck*), **[Co ment on] E. Kleinschmidt: Nichtadiabatische Abkühlung im Bereich des Jet-Stream** [Comments on E. Kleinschmidt's nonadiabatic cooling in the jet stream region.] And **[Rep by] Kleinschmidt.** *Beiträge zur Physik der Atmosphäre*, Frankfurt a.M., 32(3/4):265–27 **1960.** 4 figs. German, English and French summaries p. 265. **DWB, DLC**—It will shown that the 15°C adiabetic cooling which KLEINSCHMIDT (*see* 11.4–225, April 1960, *M Abs.*) postulated for the case of Jan. 8, 1953, is based on an incomplete and partially incorre application of the observed data. The large departures from the geostrophic wind, analyz by KLEINSCHMIDT are reduced considerably by a revision of the analysis. Deviations of t order of 10 degrees are consistent with the observed decelerations. *Subject Headings.* **1. No adiabatic cooling 2. Geostrophic wind 3. Jet stream dynamics.**—*Authors' abstract.*

12.7–326 551.511.33:551.521:551.

King, Jean I. F. (*GRD, A. F. Cambridge Research Center, Bedford, Mass.*), **Radiative he transfer and climatology.** (In: California. Univ. Scripps Institution of Oceanograph **Proceedings [of the] Conference on Recent Research in Climatology, March, 1957.** Issu Univ. of California. p. 77–80. **DWB** (M8 C153co)—The general principles involved radiative heat transfer calculations in astronomy, meteorology and theoretical climatology a discussed qualitatively. The author suggests that "it may be coincidence that the period reliability of the synoptic forecast 36 to 48 hours is about the same order of time that one c neglect radiative effects." Such effects could be an important factor in extended forecas Radiative equilibrium models of the atmosphere (with monotonic temperature decrease w height) can be useful as deviations of observed, from theoretical lapse rates, indicate levels ortant nonradiative processes. *Subject Headings.* **1. Radiative heat transfer 2. Radiative librium models.**—*G.T.*

12.7–327 551.511.6:551.551

Laĭkhtman, D. L. (*Main Geophysical Obs., Leningrad*), **Boundary layer turbulence and rnal parameters, [extended summary only].** *Advances in Geophysics*, N. Y., Vol. 6, pub.). p. 65–70. table, 2 refs. 24 eqs. **DWB, DLC**—The determination of the numerical es of turbulence parameters and an understanding of the factors determining the level urbulence involved in a simultaneous consideration of the equations determining wind city, temperature and turbulence characteristics as influenced by external parameters. solution of this problem is given for the simplest case when the state is constant in time the turbulence coefficient is replaced by its mean value for the boundary layer. The rnal parameters considered are as follows: geostrophic wind, short wave radiation, tempera- and humidity of the boundary, layer, soil temperature at great depth and thermophysical erties of the soil and the roughness parameters. The equations that are determined are e for the coefficient of eddy diffusion, horizontal components of wind velocity, air tempera- , air humidity, mixing ratio, temperature of active layer of the soil and the boundary layer kness. By combining the ordinary system of hydrodynamical equations with the equation he turbulent energy balance on the integral form at the upper limit of the boundary layer, osed system is attained. The solution of the equations is presented. A table giving the n characteristics of turbulence for the Central-Arctic region of the U.S.S.R. estimated on basis of external parameters ($Z_0=1$ mm) is presented. *Subject Headings.* **1. Boundary r turbulence 2. Turbulence.**—*I.L.D.*

12.7–328 551.511.6:551.551.8

Monin, A. S. (*Academy of Science, Moscow*), **General survey of atmospheric diffusion.** *nces in Geophysics*, N. Y., Vol. 6, pub. **1959.** p. 29–40. 29 refs., 9 eqs. **DWB, DLC**—contents of this paper include the following: a discussion of the significance of atmospheric sion to animal and plant life; the factors influencing atmospheric diffusion including the re of the source; propagation of pollution through the air under different meteorological litions; the characteristics of pollution itself; the effect of gravity; chemical and radioactive sformation of pollutants, etc. and interaction of pollution with earth's land or water sur- s; the wide spectrum of scales of turbulent diffusion; mathematical treatment of the analogy veen diffusion in the field of small-scale turbulence and molecular diffusion; and examination ne semi-empirical equation of turbulent diffusion; the statistical approach to turbulent sion; consideration of the bounded velocity of turbulent diffusion and diffusion in the field rge scale turbulence. *Subject Headings.* **1. Atmospheric diffusion 2. Turbulent diffusion.** *L.D.*

12.7–329 551.511.6:551.551.5

Priestley, C. H. B. (*C. S. I. R. O., Div. of Met. Physics, Melbourne, Australia*), **The isotropic and the microscale of turbulence.** *Advances in Geophysics*, N. Y., Vol. 6, pub. **1959.** –100. table, 6 refs., 5 eqs. **DWB, DLC**—On the basis of experimental data on turbulence lable in the literature, the author determined with considerable accuracy the typical tion of various significant points in the atmospheric spectrum. With the aid of the appro- te equations, the author presents the determinations of the isotropic limit and evaluates nicroscale of turbulence. It is shown that the isotropic limit occurs at about $\frac{(NZ)}{U}=0.6$. es of the microscale of turbulence λ_2 as determined by different authors are presented in ble and are shown to be in good agreement. *Subject Heading:* **1. Microscale of turbulence.** *L.D.*

12.7–330 551.511.6:551.551:533.15

Schmidt, F. H. (*Royal Netherlands Met. Inst., DeBilt, Netherlands*), **On an apparent dox in the theory of vertically rising jets.** *Advances in Geophysics*, N. Y., Vol. 6, pub. . p. 421–423. fig., 7 refs. **DWB, DLC**—"There exists a controversy with respect to nfluence of turbulence on the shape of plumes or jets rising vertically into an environment without mean horizontal motion. According to simple dimensional consideration a line relation between the width of the jet and the distance from the virtual point source mu exist." However, some observations seem to show that an increase of the width of the according to power of distance from the source a little less than one would be a better appro mation. The resolution of this paradox is based upon the existence of a striking differen between the fundamental concepts used to calculate the width of a vertically rising jet and tho underlying the treatment of horizontal plumes. In the former it is assumed that the enviro ment is originally at rest all turbulence being caused by the velocity shear between the and the environment. In the latter there is the underlying assumption that no velocity diffe ence exists between the plume and environmental air and all turbulence is attributed to t wind structure. It is contended that the general turbulent diffusion of horizontally movi plumes is the result of turbulence of natural wind and of the wake effects of the plume. T diffusion of stack gases can be described by means of dimensional analysis as in the case of vertically rising jet and it is found that the shape of the plume is that predicted by Sutton theory. The result can be interpreted as the broadening of a wake due to the external fie of turbulence. *Subject Headings:* **1. Vertically rising jets 2. Atmospheric turbulen 3. Plumes 4. Turbulence theory.**—*I.L.D.*

GENERAL CIRCULATION (551.513)

See also: **Large scale atmos. circulation,** 12.7–4; **Structure of atmos., N. Hemisphere** (Defant), 12.7–27; **Stationary met. fields of large scale** (Okamura), 12.7–321; **Non-adiabatic cooling in jet stream region** (Danielsen, Reiter), 12.7–325; **General circulation** (Defant), 12.7–347; **Mean monthly upper tropospheric circulation, Tropical Pacific,** 12.7–396; **Steady topographical perturbation of a zonal current, N. Hemisphere** (Oi), 12.7–397.

12.7–331 **551.513(9**

*Leonov, N. G., **Kharakter zonal'noĭ tsirkuliatsii nad vostochnym poberezh'em Antarktic** [The nature of zonal circulation over the eastern coast of Antarctica.] (In: Sovetska Antarkticheskaia Ekspeditsiia 1955–, **Klimat Antarktiki.** Moscow, **1959.** p. 79–91. 5 tabl 3 refs.)—**DLC** (QC994.9 K6), **DWB** (M82.1/99 M886kL)—On the basis of atmospheric wi soundings made at Mirny and Mawson during March 1956–Feb. 1957, the author examines t velocity of zonal transport over the eastern coast of Antarctica, its variation with height and seasonal characteristics. Wind soundings at the surface of the earth and at heights of 1.5, 6, 9, 12, 15 and 18 km were used. Tables giving the number of wind observations in the fr atmosphere at Mirny and Mawson, the mean velocity of zonal transport (m/sec), the variati of mean velocities of zonal transport in different layers (m/sec), intermonthly and interseason variations of velocity of zonal transport (m/sec) and the mean monthly pressure at sea level Mirny and Mawson are presented. Analysis of the data leads to the following conclusion (1) a well marked seasonal variation of zonal transport in the free atmosphere exists over t eastern coasts of Antarctica, (2) the characteristics of the seasonal variation of zonal transpo in the troposphere differ from the characteristics of the zonal transport in the stratosphe The velocity of easterly transport in the lower layers and also the height at which the change easterly to westerly transport occurs from fall to winter and further from spring to summ increases in the troposphere. (3) In the stratosphere the velocity of the westerly transpo increases gradually with height in winter and diminishes with height in summer, being actua replaced by easterly transport. The Antarctic depression occupies the most northerly positi (greatest distance from Antarctica) in winter and the least southerly position in fall; (4) in t region of Mirny the Atlantic Antarctica depression is situated farther from the coasts Antarctica and is developed better than in the Mawson region and (5) the region of high pressu over the eastern coasts of Antarctica is best developed with height and extends farther to t north during the summer. *Subject Headings:* **1. Zonal circulation 2. Wind soundings 3. A arctica.**—*I.L.D.*

12.7–332 551.511:**551.513.1**(

Gusev, A. M., **Teoreticheskaia skhema tsirkuliatsii vozdukha nad Antarktikoĭ.** [Th retical model of atmospheric circulation over Antarctica.] (In: Sovetskaia Antarkticheska speditsiia 1955–, **Klimat Antarktiki.** Moscow, **1959.** p. 92–101. fig., 6 refs., 3 eqs.) **C** (QC994.9.K6), **DWB** (M82.1/99 M886kL)—An approximate theoretical model of the nospheric circulation over Antarctica involving the movement of two oppositely directed currents separated by a boundary which slopes under the influence of Coriolis forces in cordance with the Margules formula. Along this boundary surface wave disturbances arise. e most probable and interesting wave was the form of a single node seiche in which the bound- surface oscillates relative to a circle passing through the center of radii. The second tem of waves arises at the boundary surface as a result of the relative measurement of two currents differing in temperature and density. The dimensions of these waves, moving in a cle, depend upon the relative velocity of the currents their density and radius of circulation l the form of the waves depends chiefly upon their mutual direction. N. E. KOCHIN's uations describing the small oscillations on a boundary surface between the currents sloping ording to the Margules formula and the solutions for the component velocities u and V l the frequency o are presented. On the basis of the fact that waves having a length of 00 km are unstable and that such waves exist in the atmosphere and on the basis of experi- ntal data on waves obtained in basins, it is concluded that a circular two-layer circulation h a plane or spherical boundary exists in the atmosphere. The classical example of such a culation on the earth is the atmospheric circulation over Antarctica. Observations made Antarctica confirm the presence of the double layer property. The maximum wind velocity it the coasts where wave disturbances on the boundary surface are best developed. There observed series of cyclones which are longitudinal waves developing at the boundary face. Observations confirm the existence of transverse waves produced by variations in slope angle of the boundary in a latitudinal direction. *Subject Headings:* **1. Atmospheric culation models 2. Atmospheric circulation over Antarctica 3. Antarctica.**—*I.L.D.*

12.7–333 551.513.1:551.515.7

Sumner, E. J., **Blocking anticyclones in the Atlantic-European sector of the Northern misphere.** *Meteorological Magazine*, London, 88(1048):300–311, Nov. **1959.** 6 figs., 6 les, 6 refs. Also: Woffinden, Charles M. (*U. S. Weather Bureau, Washington*), **Blocking ion.** *Ibid.*, 89(1058):236–240, Sept. **1960.** 3 figs., 4 refs. **DWB, DLC**—The present dy, a continuation of an earlier one, considers the seasonal and geographical distribution of cking in the eight year period 1949–56. The patterns selected for study were only those ich resembled the two main synoptic types, namely, "diffluent" and "meridional" types. amples of both are graphically represented. The area considered lay from 100°W eastwards 60°E, and north of 50°N. There were 115 distinct spells of blocking of average duration ring the eight years. Frequency distribution of spell duration is graphically represented. cular variation, monthly distribution, distribution with latitude and longitude are discussed l tabulated. Constitution of spells, their formation, decline and general character are isidered. It is concluded that blocking is of major importance in forecasting the weather the British Isles for periods up to several weeks ahead because of its large area of influence, g persistence and dominating position near the country. The note by WOFFINDEN is a nment on the article by SUMNER. He states there is a difference in the criteria used to ermine blocking action in the U. S. and Great Britain. If blocking is defined in terms of iters of large positive anomaly at the 700 mb level then a different longitudinal distribution is own than that given by Sumner. A maximum of occurrence is shown over Bering Sea and vis Straight. The anomalies in this region are associated with extreme weather anomalies the U. S. and often occur a week or two following the appearance of a strong blocking high er Europe and may be connected with them. Two examples are cited showing some form of cking "wave" or "impulse" apparently proceeding upstream against the westerly current. *bject Headings:* **1. Blocking anticyclones 2. Blocking action 3. Zonal indices 4. British es 5. Northern Hemisphere.**—*I.S. and R.B.*

12.7–334 551.513.1

Tunnell, G. A. (*Marine Div., Met. Office*), **The pattern of the general atmospheric circula- 1.** *Marine Observer*, London, 30(188):72–85, April **1960.** 9 figs., 22 refs. **DLC**—To a ple sailor the distribution of cyclones and anticyclones has little order. A picture of world id system can be obtained from thousands of observations made in merchant and naval

ships and land stations. The effect of air mass upon the general circulation depends on it
source region. Air coming from a maritime anticyclone is very dry and stable. A knowledg
of planetary surface wind patterns gives a framework by which a study of world climate ma
be fitted together. The article is well illustrated with charts and figures. *Subject Heading*
1. Atmospheric circulation 2. Circulation patterns.—*A.H.K.*

12.7–335 **551.513.1**:551.**558.1**(235.24

Yang, Chien-Chu and Lo, Hsieh-wu, **K voprosam o tsirkuliatsionnykh sistemakh i term**
cheskoĭ poli nad tibetskim plato. [Circulation systems over the Tibetan Plateau and th
thermal effect of the plateau.] *Acta Meteorologica Sinica*, Peking, 28(4):264–274, **195**
5 figs., 6 tables, 11 refs. In Chinese; Russian summary p. 274. **DLC**—An analysis of recen
data from the Tibetan plateau on thermal effects on circulating system. Except for July an
Aug. the Plateau is under the influence of the upper westerlies. Stations at 2500–4500
elevation show very light westerlies in autumn and spring. In April the Plateau is more of
heat source than in July. The S.E. part of the Plateau constitutes a heat source all yea
Subject Headings: **1. Atmospheric circulation 2. Thermal effects on circulation pattern**
3. Tibetan Plateau.—*M.R.*

12.7–336 551.501.**7**:551.51**3.2**:551.55**7**

Bayer, Karel, **Poznámka k metode k určení charakteru cirkulace v haldině 500 mb**
severní polokouli. [Note on a method for determining the character of circulation at th
500 mb level over the Northern Hemisphere.] *Meteorologické Zprávy*, Prague, 11(3):80–8
1958. 5 figs., 3 refs. Hungarian, Russian and English summaries p. 80. **DWB**—A correctio
of the flow index p as defined in an earlier paper (*see* 10.9–134, Sept. 1959, *Met. Abs.*) is intro
duced to eliminate the influence of intensity of the circumpolar current. The newly introduce
index m is determined by a relation $m=pA-p$, where p denotes the previous flow index an
pA is given by a difference $pA=P_{2A}-P_{1A}$, P_{1A} being the contour line of the absolutely lowe
value in the Northern Hemisphere and P_{2A} the contour line of the absolutely highest valu
circumpolarly closed in the Northern Hemisphere. The index m represents, in relation to th
whole circumpolar current, the width of a jet stream "disturbed" by independent pressu
centers. It can have only positive or zero values, $m=0$ representing the ideal case of a purel
zonal circumpolar circulation. On the basis of material evaluated so far, circulation at $m\leqq 1$
can be taken for zonal, at $m\geqq 20$ for prevalently meandering, for the 200 ft contour interva
With the index m, the annual variation is entirely eliminated, as shown in a figure indicati
the values of m for the extreme months of Jan. and July 1949. Results obtained by means
the methods of the indexes m and p are compared with Defant's analysis made by means
meridional profiles of geostrophic wind. *Subject Headings.* **1. 500 mb circulation pattern**
2. Circulation indexes.—*Author's abstract.*

12.7–337 551.51**3.2**(9

Lenov, N. G., **Meridional'nyĭ perenos v raĭone Mirnogo i Mausona.** [Meridional tran
port in the region of Mirny and Mawson.] *Meteorologiia i Gidrologiia*, Leningrad, N
8:15–19, August 1959. 2 figs., table. **DWB, DLC**—The characteristics of the meridion
transport over the eastern coast of Antarctica are investigated on the basis of atmospheric wi
soundings carried out in the Mirny and Mawson districts during the first continental Antarct
expedition (March 1956–Feb. 1957). A table giving the frequency of southerly and norther
wind components at these districts during March 1956–Feb. 1957 and pressure field maps f
6 o'clock July 7, 1956 and for 6 o'clock Oct. 18, 1956, illustrating typical positions durin
meridional and zonal development of atmospheric processes are presented and analyzed. Th
results of the study led to the following conclusions: (1) the directions of meridional transpo
in Mirny and Mawson are different in the troposphere; as in Mirny northerly transport pr
vails, in Mawson southerly; (2) a northerly transport prevails in the stratosphere in bo
Mirny and Mawson; this prevalence becomes more marked with increase in height; (3) th
zonal component of the horizontal temperature gradient has on the average an east to we
direction in the troposphere over Mirny but a west to east direction in the stratosphere.
Mawson the prevailing direction of the component is from east to west in both troposphere an
stratosphere; (4) stationary cyclones moving along the southern part of the Indian Ocean occ

ften along the coasts of Eastern Antarctica near the meridian of Mirny; (5) during the winter he displacement of cyclones over southern India usually proceeds with a large meridional omponent. In fall the most frequently observed zonal development of cyclones from west o east is close to the coast of Antarctica. *Subject Headings:* **1. Meridional circulation 2. Zonal irculation 3. Wind soundings 4. Pressure field charts 5. Mirny, Antarctica 6. Mawson, ntarctica.**—*I.L.D.*

ATMOSPHERIC DISTURBANCES (551.515)

See also: **Met. situations in which aircraft were damaged by hail** (Harrower, Evans), 12.7–58; **Arctic front effects on climate and crops, Iceland** (Malmström), 12.7–83; **Hurricanes,** 12.7–111; **Audio-frequency fluctuations in geomag. field** (Wilcox), 12.7–163; **Seismograms associated with tornadoes** (Kisslinger), 12.7–192; **Radar detection of heavy rainfall, Utsunomiya** (Ōtsuka, Ōnuki), 12.7–252; **Overload of wind mills during gusts and squalls** (Frankfurt), 12.7–282; **Winter thunderstorm, Murmansk** (Iakovlev), 12.7–303; **Cold front precip., Central European U.S.S.R.** (Vetlov, Petrenko), 12.7–304; **Conditions for frost formation, Ukraine** (Bialynitskaia, Ped'), 127–305; **Displacement of surface centers of cyclones** (Piatygina, Emel'ianova), 12.7–308; **Forecasting thunderstorms, Transcaucasia** (Guniia), 12.7–309; **Production of kinetic energy from condensation heating** (Riehl), 12.7–323; **Blocking anticyclones** (Sumner), 12.7–333; **Daily ground inversion layers** (Perelet), 12.7–368; **Air mass temps., Macquarie Is.** (McRae), 12.7–369; **Pressure rise, Yakutat** (Emerson), 12.7–372; **Pressure disturbance** (Rikitake), 12.7–376; **Morphology of thunderstorms and hailstorms** (Newton), 12.7–389; **Area-intensity relationship of storm rainfall** (Parthasarathy et al.), 12.7–408.

12.7–338 551.515.1/2:551.577.37

*Hershfield, David M. and Wilson, Walter T., **A comparison of extreme rainfall depths rom tropical and nontropical storms.** *Journal of Geophysical Research*, Wash., D. C., 65(3): 59–982, March **1960.** 7 figs., 6 tables, 18 refs. **DLC**—It has been suggested that tropical torms are significantly different from other storms with respect to frequency and other hydroogic characteristics of extreme rainfall. Accordingly, for the region affected by storms of ropical origin, we have made routine frequency analyses and have also examined available ata for area-depth and duration-depth comparisons with storms not regarded as having ropical origin. In the following important respects the extreme rainfall associated with ropical storms does not stand out as being significantly different from extreme rainfall associted with other types of storms: (a) frequency distribution of annual maximum for durations f 10 min to 168 hrs; (b) shape of area-depth curve up to 5000 square miles; (c) time distribution vithin largest 24- and 48-hr rainfalls; and (d) time sequence or mass curves of these rainfalls. *Subject Headings:* **1. Rainfall depths from storms 2. Tropical storms.**—*Authors' abstract.*

12.7–339 551.515.13

Leonov, N. G., **Peremeshchenie prizemnykh tsentrov tsiklonov.** [Displacement of the yclone centers near the ground.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 0:3–12, **1958.** 3 figs., 3 tables, 5 refs., 13 eqs. **DWB, DLC**—Shifting of the cyclone center s considered as a movement of special point of the baric field, which is defined by the differential quations of function of the velocity component in the shifting cyclone. The method of etermining the second derivatives on time affects the accuracy of the forecastings of the cyclone ovements. The Diubiuk and Kibel methods are discussed and simplified with the Green unction for final integration. Numerical data on the cyclone velocities were computed on he basis of the tabulated characteristics of the 15 cyclones recorded from 1951 to 1955. Comarison between computed values, factual movements and errors are given in Table 3. Results lso indicate that the displacements of cyclones during 24 hrs were well determined by disribution of advection of the turbulence and advection of temperature at their initial moment. *ubject Headings:* **1. Cyclone displacement 2. Cyclonic centers.**—*N.P.S.*

12.7–340 551.515.2:551.461.2

†Redfield, Alfred C. and Miller, A. R. (*both, Woods Hole Oceanog. Inst.*), **Water levels ccompanying Atlantic Coast hurricanes.** *Meteorological Monographs*, Boston, 2(10):1–23, **957.** 21 figs., 35 refs. **DWB, DLC**—The water levels that occurred along the Atlantic coast

during five recent hurricanes are described and compared. The forerunner, a rise in wat
which may precede the passage of the storm by many hours, is found to depend upon th
and direction of the general wind field into which the storm advances. The surge t
companies the violence of the storm depends in duration on the speed of progression of th
center. Maximum water levels of 8 to 9 ft above the predicted tide developed at p
between 40 and 100 n mi to the right of the storm center; elevations in excess of 5 ft o
from 50 n mi to the left to 150 n mi to the right of the center. Although the elevation
surge appears to depend primarily on the distance and direction from the storm cente
topography and the structure of the wind field may influence the effects of individual s
The wind fields of the storms which have crossed the latitude of southern New Engla
characterized by convergence zones at which the wind direction shifts abruptly. The di
tion of these convergence zones relative to the storm center is variable. It appears to a
for the degree to which the surge extends into the left semicircle of the storm and for th
at which maximum water levels occur. Following the passage of the storm center, resur
occur which are attributed to the motion of the disturbed water in returning to normal
tions. Examples include: (1) a surging of water, impounded by the wind on one s
Buzzards Bay, to the opposite shore when the wind shifts; (2) a solitary wave which tra
Long Island Sound producing a surge which arrives at its western end approximately 4 h
the storm's passage; and (3) undulations of the sea surface on the open coast having p
of 5.5 to 7.2 hr depending on the location. The nature of the surge, its character on o
islands, its realation to tidal phenomena, and the value of past experience as a guide to
hazard are discussed. *Subject Headings:* **1. Hurricane surges 2. Storm tides 3. Sea
changes 4. Atlantic Coast, U. S.**—*Authors' abstract.*

12.7–341 551.515.21:551.5
Jordan, C. L. (*Florida State Univ.*); Hurt, David A., Jr. and Lowrey, Clifford A.
Airborne Early Warning Squadron Four, Jacksonville), **On the structure of hurricane Da
Aug. 27, 1958.** *Journal of Meteorology*, Boston, 17(3):337–348, June **1960.** 12 figs., 1
DWB, DLC—An unusually large collection of aircraft-reconnaissance data was made in hur
"Daisy" on 27 Aug., 1958. These data consist primarily of detailed flight-level inform
collected by the research aircraft of the National Hurricane Research Project and radar
taken from the operational reconnaissance aircraft of the U. S. Navy. At this time, hur
Daisy was a small, slow-moving storm off the Florida east coast with winds in excess of 1
in the lower troposphere. The concentrated nature of this vortex is clearly shown by the
level wind and temp. data and by the weather patterns shown on the radar films. The
from the search radar show a central, ring-like echo only a few miles wide which corres
closely with the area of maximum observed winds. The height-finding radar shows this c
echo—which is associated with the wall cloud surrounding the hurricane eye, to be
vertical and to extend above 60,000 ft. *Subject Headings:* **1. Aircraft hurricane reconnais
2. Hurricane dynamics 3. Hurricane "Daisy" (1958).**—*Authors' abstract.*

12.7–342 551.515.3:551.515.4:551.578.7:551.5
Ludlam, F. H. and Macklin, W. C. (*Imperial College, London*), **The Horsham hai
of 5 September 1958.** *Meteorological Magazine*, London, 89(1,059):245–251, Oct.
photo, 4 figs., ref. Rowsell, E. H., **Storms of 5 September 1958, over south-east En**
Ibid., 89(1,059):252–257, Oct. 1960. 3 photos, 2 figs., 2 refs., 3 tables. Horner, F
thunderstorms of 5 September 1958—lightning discharges and atmospherics. *Ibid.*, 89(
257–261, Oct. 1960. table, 2 figs., 3 refs. **DWB, DLC**—Some unusually severe thunders
occurred over southern England on Sept. 5, 1958. A particularly severe storm was ob
in the Horsham area. The first of these papers outlines the synoptic situation leading
these storms and gives an account of the Horsham storm in detail built up from ve
reports and from radar and aeroplane observations. The second paper discusses the
and hail distribution caused by the storms, the associated tornadoes and their track
describes some of the damage which occurred. The third paper outlines the electrical fe
of the collection of storms detailing among other items the frequencies of lightning f
Subject Headings: **1. Thunderstorms 2. Tornadoes 3 Hail 4 Lightning 5. Storm
distribution 6. England.**—*R.B.*

12.7–343 551.515.3:551.556.4:551.578.46(99)

Valtat, B.; Gilbert, J. and Magniez, R. (*all, Météorologie Nationale, Paris*), **Le "phénomène de Loewe" en Terre Adélie.** ["Loewe phenomenon" in Adélie Land.] *La Météorologie,* aris, Ser. 4, No. 57:77–112, Jan./March **1960.** 15 figs., 5 refs. French, English, Spanish and ussian summaries p. 77. **DWB**—The "Loewe phenomenon" is a sudden and violent storm bserved about ten times a year in the Antarctic. These storms are characterized by very oarse and large amplitude wind variations; both in direction and speed they are attended y violent drifting and blowing snow. Simultaneously are observed rapid variations at soil f pressure, temperature and humidity and also modifications in the altitude conditions. The uthors give a detailed description of two typical cases of the evolution of this phenomenon bserved at the Dumont-d'Urville base on Aug. 29–30, 1958 and on April 20–22, 1957. For ach case, the synoptic evolution, the evolution of upper air temperatures and winds are studied nd the diagrams of recordings of the various meteorological elements are carefully analyzed. hese diagrams reproduced in the article give an idea of the intensity of this phenomenon. aking these observations as a basis, the general features and a general pattern corresponding o the "average phenomenon" can be pointed out. Finally, the authors state a few hypotheses n the causes of the starting of the phenomenon. They especially try to determine the causes which are at its origin and those which give it a whirling form. *Subject Headings:* **1. Loewe henomenon 2. Whirlwinds 3. Snow drifts 4. Adélie Land, Antarctica.**—*A.V.*

12.7–344 551.506.3:551.515.4(789)

Moore, C. B.; Vonnegut, B. and Emslie, A. G., **Observations of thunderstorms in New Mexico.** Arthur D. Little, Inc., Contract Nonr 1684(00), Unnumbered report, June 15, **1959.** 10 p. 39 figs., 4 tables (1 fold.), 46 refs., 20 eqs. **DWB** (M(051) L778ab)—The "simple" hunderstorms that formed almost daily over Mt. Withington in central New Mexico were tudied during the summers of 1956, 1957, and 1958. Observation site and instruments are described. In three years more than 100 thunderstorms were observed and more than 60 tudied in detail. Also 15 growing clouds were studied from within. The data obtained from hese observations are presented and discussed. Interesting observations were made concerning thunderstorm electrification. It was observed that the currents resulting from the movement of charge carried by updrafts and downdrafts and the currents resulting from point disharge are many times larger than the currents carried by precipitation when it falls to the round. The data suggest a close connection between rainfall and electrification, leading to he conclusion that the electrification is probably the cause rather than the result of the preipitation. *Subject Headings:* **1. Thunderstorm observation data 2. Rainfall and electrification . New Mexico.**—*I.S.*

12.7–345 551.515.41:551.578.7

Ludlam, F. H. and Macklin, W. C. (*both, Imperial College, London*), **Some aspects of a evere storm in S. E. England.** *Nubila,* Verona, Italy, 2(1):38–50, **1959.** 7 figs. (incl. photo), refs., eqs. Italian summary p. 38. **DWB**—On 5 Sept. 1958 a severe thunderstorm traveled cross S. E. England from the Isle of Wight to the London area and later to Suffolk. It prouced a very heavy rainfall along its path, and in the neighborhood of Horsham, Sussex, was ccompanied by an intense hailstorm in which hailstones of unusual size fell (diameter up to cm). The present paper is a preliminary discussion of some aspects which have a bearing n the theory of cumulonimbus evolution. It covers the movement of the storm, the distribuion of rain and hail, the characteristics of hailstones, and the energy of cloud thermals. *Subject Headings:* **1. Thunderstorm dynamics 2. Hailstorms 3. Southeastern England.**—*N.N.*

12.7–346 551.515.71

Haarländer, Hans, **Beitrag zu einer Theorie stationärer Antizyklonen.** [Contribution to he theory of stationary anticyclones.] *Germany. Deutscher Wetterdienst, Berichte,* 9(65): –29, **1960.** 22 figs., 4 tables, 22 refs., 95 eqs. German and English summaries p. 3. **DWB, DLC**—In connection with Hollmann's theory on the dynamics of stationary pressure fields the resent paper gives an extended assumption for solution of an integral differential equation or warm and cold stationary anticyclones. Besides an asymmetric temp. distribution at the tandard isobaric levels is included in the assumption for the solution of the inversion of vertical circulation at the transition from the troposphere to the stratosphere. The stratosphere turns out to be isothermal according to empirical data. The analytic model shows furthermore a spatially tilted axis of the maximum pressure. The extreme layer, i.e. the layer of maximum horizontal mass flow is in direct proximity to Faust's zero layer (Nullschicht). The assumption for solution of the differential equation includes the parameter ξ, by means of which the air mass balance of our stationary anticyclone (or cyclone) is controlled. It follows from this parameter that the zero position of vertical circulation coincides with the tropopause. The distribution of the variables T, div. b, ov_z, v_z and $\frac{dQ}{dt}$ at the significant levels is deduced analytically. The final equations are evaluated numerically and represented graphically. The distribution of heat sources and sinks can be attributed to a thermically driven circulation. Our assumption for solution is also valid for cold and warm stationary cyclones. *Subject Headings:* **1. Stationary anticyclones 2. Anticyclone mechanics.**—*Author's abstract.*

12.7–347 551.515.8:551.513.2:551.557.5

†Defant, Friedrich, **General circulation of the atmosphere in the light of more recent investigations.** International Institute of Meteorology, Univ. of Stockholm, Contract AF 61(514)-963, Technical (Scientific) Note No. 3, April **1959.** 38 p. 35 refs. **DWB** (M(051) I61tn)—Extensive synoptic studies carried out by the author at the International Institute of Meteorology in Stockholm [7] to [11] for selected periods in midwinter 1956 and based on a total careful check of all the radiosonde ascents of the Northern Hemisphere (temperature and wind) indicated the following important basic phenomena inside the general circulation of the atmosphere: 1) A threefold subdivision of the tropopause-level by means of two hemispheric tropopause breaks. One interrelated with the position of the Polarfront Jet stream and another one connected with the position of the Subtropical Jet stream (Tropopause-overlap near 30°N in winter). 2) Relative to the main outline of the atmospheric field of flow a classification of the radiosonde ascents has been obtained giving important information about the baroclinic structure of the atmosphere. 3) By means of several characteristics polarfront jet stream and subtropical jet stream have to be clearly distinguished from each other. 4) Meandering behavior of the subtropical jet stream in form of suddenly occurring and rapid northward advances of it (subtropical impulses) towards higher latitudes with simultaneous formation of strong and extensive blocking-anticyclones over mid-latitudes. The effects of these on the polarfront jet circulation has been demonstrated. These phenomena are discussed in this article. All statements refer strictly to the midwinter of the Northern Hemisphere. Similar studies for summer are at the time in progress. *Subject Headings:* **1. General circulation studies 2. Air masses 3. Jet stream.**—*Author's abstract.*

12.7–348 551.515.8

Kessler, Edwin, III (*GRD, AF Camb. Res. Center*) and Wexler, Raymond (*Allied Res. Assoc., Inc.*), **Observations of cold front, Oct. 1, 1958.** *American Meteorological Society, Bulletin*, 41(5):253–257, May **1960.** 6 figs., 2 refs. **DWB**—Observations of a sharp cold front and closely associated squall line in New England are analyzed. A striking feature is a line of convective clouds and heavy precipitation, which does not extend above 10,000 ft. The radar indication of the true plan-position and vertical extent of such disturbances is of special importance to air operations. *Subject Headings.* **1. Cold front observations 2. Squall lines 3. Radar signals of cold front.**—*Authors' abstract.*

12.7–349 551.515.8:551.511.2

Neiburger, M. (*Univ. California*), **The relation of air mass structure to the field of motion over the eastern North Pacific Ocean in summer.** *Tellus*, Stockholm, 12(1):31–40, Feb. **1960.** 20 figs., 4 refs. **DLC**—The normal structure of the inversion over the eastern North Pacific Ocean in summer is presented, and its relationship to the normal fields of horizontal and vertical motion is discussed. An example in which the field of motion deviated markedly from the normal is presented. The relatively large change in the motion had comparatively small influence on the temperature structure. *Subject Headings.* **1. Air mass structure 2. Air mass movements.**—*Author's abstract.*

RADIATION AND TEMPERATURE

RADIATION (551.521)

See also: **Plants and radiation** (Sauberer, Härtel), 12.7–12; **Arctowski's work with Smithsonian** (Abbot), 12.7–49; **Solar radiation applied to space navigation** (Press), 12.7–62; **Ground based infrared radiometer for obs. of satellites** (Gelinas), 12.7–69; **Infrared spectro-radiometer for obs. of earth from high altitude** (Willey), 12.7–72; **Photoperiod and cold-storage treatment in spruce budworm** (Harvey), 12.7–100; **Biol. effects of atomic radiation,** 12.7–103; **Radiation balance measurement** (Sauberer), 12.7–106; **Use of direct-beam radiation** (Brooks), 12.7–112; **Geomag. indices responsible for solar particles** (Matsushita), 12.7–131; **Energy transport from sun to earth** (Warwick), 12.7–139; **Features of extensive air showers** (Srivastava), 12.7–144; **Story of cosmic rays** (Swann), 12.7–145; **Interaction of terrestrial magnetic field with solar corpuscular radiation** (Beard), 12.7–168; **New system of co-ordinates for study of upper atmos.** (Mayaud), 12.7–169; **Irregular geomag. disturbances and influence of solar corpuscular streams on outer atmos.** (Bobrov), 12.7–173; **Outer radiation belt and solar proton obs. with Explorer VII** (Van Allen, Lin), 12.7–188; **Satellite-measured radiation** (Stuart), 12.7–189; **Solar energy measurements Lexington, Ky.** (Penrod et al.), 12.7–263; **Regional distribution of global radiation, Hungary** (Dobosi, Takács), 12.7–264; **Normal values of global radiation, Budapest** (Takács), 12.7–265; **Measurements of radiative flux** (Clarke), 12.7–276; **Influence of radiative transfer on propagation of temp. wave** (Goody), 12.7–322; **Radiative heat transfer and climat.** (King), 12.7–326.

12.7–350 551.521(435.15)

*Fleischer, Richard, **Vier Jahre Strahlungsbilanz-Registrierungen am Meteorologischen Observatorium Hamburg.** [Four years of radiation balance recording at the Hamburg Meteorological Observatory.] *Germany. Deutscher Wetterdienst, Berichte,* 7(51):9–13, **1959.** figs., 2 tables, 7 refs. German summary p. 9. **DWB, DLC**—The Meteorological Observatory n Hamburg began recording the atmosphere and earth's infrared radiation flux and the radiaion balance by the Lupolen-radiation balance meter in July, 1952. The daily sums of radiation balance and their long-wave components have been evaluated on a routine basis from the esulting graphical material. The short-wave components are measured by the Moll-Gorczynski solarimeter. The results for 1954–57 are presented. The inversion is discussed in erms of infrared radiation flux. *Subject Headings.* **1. Radiation balance data 2. Infrared adiation flux 3. Hamburg, West Germany.**—*Transl. of author's abstract* (*O.T.*).

12.7–351 551.521(437.11)

*Jílek, Josef, **Bilance záření v Praze.** [Radiation balance at Prague.] *Meteorologické Zprávy,* Prague, 11(6):165–166, **1958.** 2 tables, 2 refs. **DWB, DLC**—From measurements nade with Robitzsch pyranographs and (in a few cases) Ångström pyrgeometers and from egular climatic data, the author computed mean monthly values of elements of the radiation balance in Prague (1926–1950). The results are shown in tables in monthly means of global adiation, radiation absorbed at the earth's surface, albedo, effective outgoing radiation and et radiation balance. *Subject Headings:* **1. Radiation balance data 2. Prague, Czecholovakia.**—*G.T.*

12.7–352 551.521:551.579.2:551.588.6

Subbotin, A. I. and Miliukova, O. A., **Ob issledovanii vliianiia radiatsionnoĭ temperatury a snegotaianie v pole i v lesu.** [Study of the influence of radiation temperature on snowmelt n field and forest.] *Meteorologiia i Gidrologiia,* Leningrad, No. 12:33–37, Dec. **1958.** 3 figs., able, 6 refs., 2 eqs. **DLC**—Data are presented to show that snow melting and hence water ield proceed much more slowly in a forest than in a field and that mean daily air temperature loes not account for this difference. The role of the reduction of solar radiation in this delay vas examined by investigating radiation conditions in a forest by means of the globe thernometer. The instrument is described and Bedford's equation for radiation temperature is resented. The relationship between radiation temperature (t) and total radiation (R) direct sky radiation) is given by $R=0.018t-0.16$; the correlation coefficient is $r=0.93\pm0.01$. Simultaneous measurements of radiation temperatures in forest and field and of respective vater yields are carried out and the results are shown in a table. The mean radiation temperature in the open field was almost twice that in the forest and the water yield was twice as large. *Subject Heading:* **1. Radiation temperature effect on snow melt.**—*I.L.D.*

12.7–353 551.521:551.524.3:551.555:551.455

Zuev, M. V. and Pavlov, D. F., **Osobennosti teplovogo balansa Golodnoĭ stepi pri ursat'evskom vetre.** [Characteristics of the thermal balance of Golodnaya Steppe during Ursat'ev winds.] *Sredneaziatskiĭ Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy,* No. 2(17):41–53, **1959.** 4 figs., 7 tables, 6 refs. **DWB** (M(055) U581ts)—During the expedition of 1957 to the Hunger Steppe to study the characteristics of the Ursat'ev wind, special observations were made at Farm 3 and Akcha on the microclimate and thermal balance during an intense Ursat'ev wind and in the initial stages of its weakening. The results of observations and calculations are presented in tables and graphs giving the radiation balance, total and disperse radiation (cal/cm^2 min) at Farm 3 and Akcha daily variation of wind velocity at these points on given dates, daily variation of total scattered radiation and radiation balance at these points, atmospheric temperature, absolute humidity at 150 cm on given days, daily variation of the components of the heat balance in the Hunger Steppe, components of the heat balance at particular observation intervals etc. Disturbances in the variation of radiation balance during Ursat'ev winds may be considerable if the wind raises dust in the atmosphere. This factor does not influence the entire zone of distribution of the Ursat'ev wind. An important element in the diminution of positive values of radiation balance by day and increase of negative values by night is the reduction of radiation of the atmosphere because of low atmospheric humidity during a prevailing Ursat'ev wind having a föhn character. The large velocities of the thermal Ursat'ev wind produce turbulent heat exchange by day and night. During the night the temperature of the soil surface alters slightly owing to the turbulent influx of heat from the air to the soil. Diurnal and nocturnal totals of turbulent heat exchange during an Ursat'ev wind are close and hence the air is hardly warmed. During a weak wind on clear days the winter season the diurnal totals in absolute values are 10–12 times greater than the nocturnal ones so that considerable warming of air takes place. *Subject Headings:* **1. Radiation balance of deserts 2. Temperature variations 3. Thermal winds 4. Desert regions 5. Golodnaya Steppe, U.S.S.R.**—*I.L.D.*

12.7–354 551.521.1/2(469)

Morais, J. Custódio de, **Medidas de radiação feitas no Instituto Geofísico da Universidade de Coimbra.** [Radiation measurements at the Geophysical Institute of Coimbra University.] Reprint of 22 p. from Coimbra. Universidade. Faculdade de Ciências, Revista, Vol. 27 (1958?) 3 figs., 2 photos, 4 tables, 18 refs. **DLC, DWB** (M21.1 M827me)—A Schulze radiation balance meter which measures all components of radiation in the atmosphere was installed in Coimbra in 1957 (photographs). Samples of data obtained on winter and summer days are presented, including daily and hourly values of global, atmospheric and terrestrial radiation, and difference between received and emitted radiation. *Subject Headings:* **1. Radiation data 2. Coimbra, Portugal.**—*G.T.*

12.7–355 551.521.1/3:551.588.2(235.21)

*Danilova, N. A., **Summarnaia i pogloshchennaia radiatsiia na podgornoĭ ravnine i v vysokogornoĭ zone severnogo sklona khr. Terskeĭ-Alatau.** [Total and absorbed radiation in the valley at the foot of the mountains and in the high-altitude zone of the northern slope of the Terskeĭ Ala Tau Range.] *Akademiia Nauk SSSR, Institut Geografii, Trudy,* 75(6): 51–73, **1959.** 8 figs., 8 tables, 21 refs., 2 eqs. **DLC**—Contains preliminary conclusions on radiation conditions at the two points (2500 and 1800 m altitude), based on the standard field actinometric observations made by the staff of Tien Shan stations between Aug. 1950 and Jan. 1953. Tables showing the potential and actual amounts of total and diffused radiation, the relation between cloudiness and sunshine, the albedo and absorbed radiation are included and explained. *Subject Headings:* **1. Global radiation on slopes 2. Radiation on oriented slopes 3. Actinometric data 4. Terskeĭ Ala Tau Range, Asiatic U.S.S.R.**—*A.M.P*

12.7–356 551.521.1:551.511.33

Perrin de Brichambaut, Ch., **Considérations générales sur le bilan thermique au sol. Applications particulières à Bangui.** [General considerations on the heat balance at the ground. Special applications at Bangui.] *La Météorologie,* Paris, Ser. 4, No. 52:263–270 ct./Dec. **1958.** fig., 2 tables, 9 refs. French, English and Spanish summaries p. 263. **DWB** -All surveys concerning climatology or general circulation of the atmosphere call for a detailed nowledge of the heat balance permitting separation of the various energetic factors involved nd determination of their respective importance and their method of action. The problem f heat balance can be shown schematically in a simple manner, at any rate at the level of the round: 1) the ground receives and partially absorbs the radiation (a) global and that of solar rigin (0.3 to 3 microns) and (b) thermal, coming from the atmosphere and from clouds 5 to 50 microns). 2) The ground produces a thermal radiation (5 to 50 microns). 3) The eat balance at the ground is reflected by temperature variations and energetic transformations, vaporation and condensation, pressure variations, etc. The author examines successively ne global solar radiation, thermal radiation from the atmosphere, thermal radiation from ouds and thermic radiation from the ground. He determines the annual average of the arious factors of the heat balance and examines the transformations of thermal energy for angui (French Equatorial Africa). *Subject Headings:* **1. Heat balance at the ground . Global solar radiation 3. Thermal energy 4. Bangui, French Equatorial Africa.**—*A.V. nd author's abstract.*

12.7–357 551.521.1(432.2)

*Schöne, Werner, **Die Globalstrahlung in Gotha.** [Global radiation in Gotha.] *Zeitschrift ir Meteorologie*, 11(7):199–211, **1957.** 8 refs., 3 figs., 10 tables, eqs. **DWB, DLC**—A com-rehensive study of the global radiation based upon measurements made in Gotha between 949–1956 with a Robitzsch bimetal pyranograph. The calibration of the instrument and the cality where the measurements were made are described. The climatological results which re presented in tables, comprise the following: monthly and annual tables of global radiation; nnual variation of global radiation including mean daily totals of global radiation for radiation ays, for all days and for cloudy days; monthly and annual means of relative sunshine duration nd mean and absolute extremes of global radiation totals; frequency distribution of daily tals of global radiation; and the relationship between global radiation and relative sunshine uration. The validity of a number of formulas for computing global radiation from hours sunshine duration and the deviation of the mean monthly daily totals of global radiation mputed by formulas from actually measured values are examined. The formulas discussed re those of ÅNGSTRÖM, MATZKE and HINZPETER. Finally the global radiation measurements ade at Gotha are compared with those of Greifswald and Potsdam. *Subject Headings:* **Global radiation data 2. Gotha, Germany.**—*I.L.D.*

12.7–358 551.521.1:551.525.2:581.9(234.3)

Turner, Hans, **Wirkungen von Strahlung und Oberflächentemperatur auf die Vegetation er subalpinen Stufe.** [Effects of radiation and surface temperature on sub-Alpine vegeta-on.] [Summary only] *Germany. Deutscher Wetterdienst, Berichte*, 8(54):61, **1959.** erman summary p. 61. **DWB, DLC**—Above the forest line the prevailing wind and snow over distribute plant cover on the relief. On the other hand in the subalpine birch forest e exposure to radiation and the soil temperature determine the appearance of different egetation units. In wind-protected southerly exposed situation extreme soil surface tempera-res produce heat injury in plants and absence of vegetation; in the pine forest radiation is duced below the assimilation optimum. Forest drought and radiation damage in the case snow deposition threaten the existence of young tree growth. The albedo of subalpine ant societies shows a relationship to the duration of snow cover. *Subject Headings:* **1. Solar diation effects on plants 2. Soil surface temperatures 3. Temperature effects on plants Alps.**—*I.L.D.*

12.7–359 551.521.11(43–15)

*Brose, Karl, **Zehnjährige Mittelwerte der Sonnenscheindauer Zeitraum 1949 bis 1958.** Ten-year values of sunshine duration, 1949–1958.] *Germany. Deutscher Wetterdienst, itteilungen*, 4(23), **1960.** 24 p. 3 tables, 4 refs. German and English summaries p. 3. **WB**—New mean values of sunshine duration for 164 places in the Federal Republic of ermany are published for the years 1949 through 1958. The data are compared with the rmal values for the period 1891 to 1930 which are contained in the **Klimakunde des Deutschen eiches.** *Subject Headings:* **1. Sunshine duration data 2. West Germany.**—*Author's abstract.*

12.7–360 551.521.3:551.593.7:551.574.1:551.591.1

*†Nathan, Alan M., **Polarization technique for seeing through fogs with active optical systems.** N. Y, Univ. College of Engineering. Research Div., Contract AF 30(634)-2821, Technical Report 362.01; Final Report, June **1957.** 77 p. 5 figs., 11 tables, 39 refs., 57 eqs. **DWB** (M75 N274po)—A polarization technique is described, which effects striking improvements in visibility through fog, smoke and haze when used at night with searchlight illumination systems. Targets normally undetectable can be clearly seen. The technique can be used with either visible or infrared radiation, and is applicable to image-forming or radiation-detecting active systems. A theoretical analysis is presented of the polarization properties of various types of scattering media, and it is shown that a Mie atmosphere (spherical particles) possesses specific properties which make the application of the polarization technique uniquely effective in reducing "noise" in active optical systems. Since the main factor limiting visibility in the earth's atmosphere is the "noise" resulting from scattering of light by the spherical particles of the atmospheric aerosol, the polarization technique should be extremely practical in enhancing target detectibility. This was confirmed experimentally, and the results are described. Expressions are derived for contrast or signal-to-noise ratio in active optical systems, and the improvements resulting from the use of the polarization technique are evaluated. *Subject Headings:* **1. Visibility in fog 2. Polarization technique 3. Polarization properties of scattering media.**—*Author's abstract.*

TEMPERATURE (551.524)

See also: **Temp. and wind frequency tables, Eurasia** (Rayner, *ed.*), 12.7–7; **Temp., Antarctica** (Hisdal), 12.7–34; **Arctowski's work with Smithsonian** (Abbot), 12.7–49; **Effect of met. conditions on rice plants** (Shiraki), 12.7–84; **Nocturnal temp. in vineyards** (Fuss), 12.7–87; **Temp. measurements on high speed missiles** (Reis), 12.7–127; **Statistical method for estimating mean relative humidity from mean air temp.** (Sellers), 12.7–245; **Solar energy measurement, Lexington, Ky.** (Penrod et al.), 12.7–263; **Thermal batteries for measuring temp. pulsations** (Nemchenko), 12.7–278; **Conditions for frost formation, Ukraine** (Bialynitskaia, Ped'), 12.7–305; **Air pollution levels associated with inversions, Detroit-Windsor** (Munn, Katz), 12.7–314; **Vertical temp. gradient and fluctuations of height of tropopause** (Slobodov), 12.7–316; **Distribution of wind and temp. in lower stratosphere** (Panofsky), 12.7–318; **Thermal balance of Golodnaya Steppe during Ursat'ev wind** (Zuev, Pavlov), 12.7–353, **Shearing stress and heat transfer coefficient** (Uchijima), 12.7–381; **Polar characteristics of annual temp. variations** (Laroque), 12.7–422; **Louisiana: mean date last freeze,** 12.7–426; **Temps. under plastic roof and in slat house** (Moore), 12.7–435.

12.7–361 551.524.35:551.575

Ross, S. M. (*Met. Office, R. A. F. Fever, Germany*), **Unusual phenomena during a foggy period with temperatures below freezing.** *Meteorological Magazine*, London, 88(1048):313–315, Nov. **1959.** 7 refs. **DWB, DLC**—Several spells of fog with temperatures below 32°F occurred at Fever between Jan. 14 and Feb. 13, 1959. In this period 49 observations were made in which the wet bulb thermometer read higher than the dry bulb. Of these 46 cases were accepted with negative depressions varying from 0.1 to 1.1 degrees. Thirty-six of the readings were made in fog, and the remainder with visibilities less than 2200 yards. The temperature range was from 4°F to 28°F. The fog occurrence and temperature variation below freezing on Jan. 16 and Feb. 2 are described. The paper cites some theoretical basis concerning the occurrence of such phenomena. *Subject Headings:* **1. Fog studies 2. Temperature deviations 3. Fog effects on temperatures 4. Fever, Germany.**—*I.S.*

12.7–362 551.524.35

Zanina, A. A., **O kharakteristikakh temperaturnykh anomaliĭ v usloviiakh gornogo rel'efa i poberezhiia.** [Characteristics of temperature anomalies in mountain and coastal conditions.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 65(127):83–92, **1956.** 3 figs., table, 3 refs. **DLC**—On the basis of meteorological data of 19 Scandinavian stations for 1891–1950, the author examined the influence of physical relief upon anomalies of atmospheric temperature. A map showing the distribution of the weather stations, graphs giving the frequency of deviations of mean temperature from the normal, and isolines showing deviation of mean temperatures from the normal for Feb. and July for specific years, are sented. On the western coast where the marine climate is expressed most typically, winter viations of temperature from the normal are slight. In eastern Scandinavia deviations m the normal are frequent and large; in winter the frequency of positive deviations exceeds t of negative ones. During winter continental stations manifest small differences in the quencies of weak and intense anomalies; there is a higher frequency of positive anomalies. marine stations the frequency of weak anomalies predominate. The negative anomalies in iter are as much as −6 and −12°C while the positive ones are +4° and +10°C; this expresses usual winter circulation over northwest Europe marked by the transport of warm air from south. The spatial distribution of positive and negative anomalies in winter (Feb.), and nmer (July), is analyzed in detail in relation to elevation and continentality and marine ations. *Subject Headings:* **1. Temperature anomalies 2. Topographic effects on tempera-** **e.**—*I.L.D.*

12.7–363 551.510.522:551.524.36/7

*†Kopachevskaia, M. N., **Razmeshchenie minimal'noĭ temperatury v 2-metrovom prize-** **om sloe vozdukha vesnoĭ i osen'iu.** [Minimum temperature distribution within a 2 m air er above the ground during spring and fall.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ* *lrometeorologicheskiĭ Institut, Trudy*, No. 14:56–70, **1958.** 5 figs., 12 tables, 15 refs. **DWB**
A study was made of the distribution of minimum air temperature with height in the 2 m er above the ground under the conditions prevailing at a weather station and the change in s distribution in the environment of thermophilic crops. In the most dangerous radiation sts the lowest temperature was not at the surface of the soil but 2 cm above it. Weather nditions altered minimum temperature distribution; for example, during the incursion of a d air mass. When the drop of temperature was beginning the lowest temperature was served at the soil surface but it increased somewhat with height. Local conditions exerted erdominant effect upon the distribution of the absolute minimum in the 2 m layer above the und, it being independent of geographic position. The absolute minimum at the soil surface s observed only when the weather station was in a completely unprotected situation and was ll aired. The displacement of the absolute minimum to a higher elevation was associated h conditions of shelter produced by curved relief, proximity to forests, etc. Also ground s influenced the height distribution of absolute minimum temperatures. The values of nimum temperature in the instrument shelter were on the average 0.8°C higher. Depending on the situation of the weather station and the weather type the deviation between the nimum temperature in the shelter and in the open varied between −5.1°C and 2.4°C. The tribution of the minimum temperature in plant stands depended upon the density and ucture of the plant cover; the denser the plant cover the higher was the temperature at the und and the lower it was at the level of the plants. Extensive numerical data are presented tables. *Subject Headings:* **1. Minimum temperature distribution 2. Radiation frosts.**—*thor's conclusions and I.L.D.*

12.7–364 551.524.36

Lebedev, A. N., **Obespechennost' dat perekhoda sredneĭ sutochnoĭ temperatury vozdukha** **rez 0, 5, 10 i 15° vesnoĭ na territorii tselinnykh i zalezhnykh zemel'.** [Probability of the es of transition of the daily atmosphere temperature through 0, 5, 10 and 15° during the ing in the region of virgin and uncultivated soils.] *Leningrad. Glavnaia Geofizicheskaia* *servatoriia, Trudy*, 65(124):98–107, **1956.** 3 figs., 2 tables. **DLC**—The probability of dates transition of temperatures through various limits is investigated for the virgin and untivated lands of the USSR where the date of beginning and end of spring are between March l May. The variations in the dates of beginning of spring and its end and the dates of sage of mean air temperature through 0, 5, 10 and 15° are discussed, and it is shown that h the development of spring the rate of temperature increase slackens. The mean value of ation of transition between adjoining dates lies closer to the minimum limit so that rapid of temperature is more characteristic than a gradual rise. Nomograms for determining date of transition of temperature through any limit (0, 5, 10 and 15°C) having a given bability and for all points of a given territory require a knowledge of only one mean secular e. The mean secular date of transition of mean daily temperature through 0, 5, 10 and

15° are entered along the vertical axis and the probable dates of transition through corresponding values are placed along the horizontal axis; the sloping lines on graphs indicate the probabilities from 5 to 95%. Such nomograms are presented and their use is described. *Subject Headings:* **1. Temperature transition probabilities 2. Nomograms 3. U.S.S.R.**—*I.L.D.*

12.7–365 **551.524.36**:551.43:623.4

*Westbrook, Jane, **High temperatures at high elevations.** *U. S. Quartermaster Research and Engineering Center. Environmental Protection Research Div., Research Study Report,* EA-9, Jan. **1958.** 16 p. 4 figs., 5 tables, 13 refs. **DWB** (M86 U585ra)—In order to verify design temperatures for basic military equipment operating on the ground at high elevations, data on maximum temperatures at 1000 stations all over the world (800 in the U. S.) were plotted on scatter diagrams showing extreme maximum on record, plotted against altitude from 3000 to 15,000 ft. On this diagram is superimposed the lines for a drop of 3.3°F/1000 ft (at 5°) intervals. These lines show that only a slight error would be involved in assuming a 115°F design temperature at 3,000 ft and a drop of 3.3°F/1,000 ft. Selected stations are examined for frequency of high temperatures in summer and in July, and duration of periods of high temperatures (in hours). It was found that at high altitudes the actual high temperatures come close to the extreme high temperature in any given summer. *Subject Headings:* **1. Extreme high temperatures at high elevations 2. Mountain meteorology 3. Design temperatures for military equipment.**—*M.R.*

12.7–366 **551.524.37**:551.584.31

Junghans, H., **Temperaturmessungen aus einem Frostloch des Tharandter Waldes.** [Temperature measurements in a frost hole in the Tharandter Forest.] *Angewandte Meteorologie,* Berlin, 3(8):230–234, Sept. **1959.** 3 figs., 5 tables, 6 refs. German and English summaries p. 230. **DLC**—The annual variation of temperature, the dates of first and last frost, number of frost-free days and absolute monthly maxima and minima during 1957–1958 were recorded and analyzed for the frost hole Ernemannhütte (335 m) in the Tharandter Forest southwest of Dresden in Saxony. In 1957 Ernemannhütte had only 57 successive days without frost as compared with 120 days for Wildhacker. A comparison between Fichtelberg (1215 m) and Ernemannhütte shows that the frost-free period on the former was twice as long as in the frost hole. While on the Fichtelberg no ground frost occurred in July and Aug. during 1916–1955 frost recurred in June, July and Aug. in the frost hole. Not only in summer but during the entire year the lowest monthly minima in the frost hole are below those of the Fichtelberg. *Subject Headings:* **1. Frost data 2. Annual temperature variations 3. Frost holes 4. Tharandter Forest, Saxony, Germany.**—*I.L.D.*

12.7–367 **551.524.371**:631.544:678.5

Primault, Bernard (*l'Institut Suisse de Météorologie, Zurich*), **Nouveaux essais de lutte contre le gel au moyen de coiffes individuelles.** [Recent experiments of frost control by means of individual screens.] *Geofisica e Meteorologia,* Genoa, 8(1/2):11–15, Jan./April **1960.** 5 figs., 2 refs. French and English summaries p. 15. **DWB**—In Switzerland and Germany many screens of straw are used to protect individual vine-stocks against frost. The author tried to get the same results with other materials. He took rigid plastic on a frame of iron wire, thin plastic, straw, straw together with thin plastic, and a cone of thick pasteboard placed on the soil to protect tomato-plants. The temp. measurements showed clearly that the straw and the pasteboard screens give a certain protection. The plastic screens on the contrary lower temp by 1 to 2°C during clear nights and reduce the effect of the straw. They are therefore quite useless. *Subject Headings:* **1. Frost protection of vineyards 2. Vine-stock protection.**—*Author's summary.*

12.7–368 **551.524.4**:551.577.3:551.515.4

*Perelet, G. I., **Priroda prizemnykh zaderzhivaiushchikh sloev nad Odessoĭ.** [Nature of daily ground inversion layers over Odessa.] *Kiev, Ukraine. Nauchno-Issledovatel'ski Gidrometeorologicheskiĭ Institut, Trudy,* No. 17:40–49, **1959.** 2 figs., 6 tables. **DWB**—Using radiosonde observations of the Odessa Geophysical Observatory and synoptic data for 1952–1956, the author investigated the nature of diurnal inversion layers giving statistical data on eir frequency, thickness, intensity and their relationship to shower and thunderstorm activity. ve types of surface inversion layers are established, namely: (1) inversions of marine origin, displaced inversions, (3) stratification inversions, (4) frontal inversions, and (5) evaporation in) inversions. The circulation conditions and synoptic situation associated with the forma- n of each type of inversion are discussed. Data are presented on the general characteristics surface inversion layers in individual years, the frequency of different types and variety surface inversions when the wind is from the sea, frequency of diurnal surface inversion ers of varying thickness, and frequency of surface inversion layers of varying intensity for 52–1956. The presence of surface inversions during the day is unfavorable to the develop- nt of intramass and frontal showers. Accordingly, the inverse relationship should hold tween the presence of diurnal surface inversions and thunderstorm activity. A table giving shower activity on days with surface inversion layers for 1952–1956 is presented. The bability of the absence of shower and thunderstorm activity on days with surface inversion ers decreases sharply with distance from the shore line. *Subject Headings:* **1. Diurnal face inversion layers 2. Inversion layers 3. Synoptic data 4. Synoptic conditions for ersions 5. Odessa Geophysical Observatory 6. Odessa, Ukrainian, S.S.R.**—*I.L.D.*

12.7–369 551.524.7:551.515.8(97/99)

McRae, J. N. (*Bureau of Met., Melbourne*), **Air mass temperatures in the troposphere er Macquarie Island.** *Australian Meteorological Magazine*, Melbourne, No. 27:12–18, Dec. **59.** 2 figs., 2 tables, 3 refs. **DWB**—McIntyre (1950) has indicated that the shape of sonal frequency polygons of temperature at a particular level and station depends on the ative frequency of different air masses at the level. For a summer and a winter month the nperature distribution in various air masses at four levels in the troposphere at Macquarie and were examined, the stable layers being regarded as air mass boundaries. The histograms ow, as expected that the frequency of occasions of cold air decreases and of warm air increases h height. Given large enough samples, the temperature distribution within air masses at acquarie Island appears to be normal. This is supported by significant tests. However, st of the total distributions below 300 mb, particularly in winter, probably are not normal. this probably applies at most stations outside equatorial areas, total distributions of tempera- e will not be adequately defined by their means and standard deviations but could be resented by the means, standard deviations and total frequency of each air mass class ntained in the total distribution. This information would be valuable for general studies of frontal and air mass structure of the atmosphere. *Subject Headings:* **1. Air mass tempera- es 2. Tropospheric air mass temperatures 3. Macquarie Island.**—*Author's abstract.*

12.7–370 551.524.73:551.510.52

Makhover, Z. M., **Sravnenie sredneĭ temperatury troposfery s temperaturoĭ na urovne erkhnosti 500 mb.** [Comparison of the mean temperature of the troposphere with the nperature at the 500 mb level.] *Meteorologiia i Gidrologiia, Leningrad*, No. 3:29–30, **rch 1960.** fig., 3 refs. **DWB, DLC**—The seasonal temperature variation in the tropo- here and in the level of 500 mb are studied in the region of Murmansk, Moscow, Kursk and a. The temperatures and altitudes are plotted on the same chart for each region for the alysis and comparison of the mean temperatures. The temperatures on level 500 mb at the thern regions are varying about the mean temperature for the troposphere with deviations m +3° to −4°C. These deviations are increasing in the southern regions and they have a nimum at the spring time and maximum at the autumn. In conclusion it was stated that isotherms at the level 500 mb represent the distribution of mean temperatures in the tropo- ere. *Subject Headings:* **1. Tropospheric temperatures 2. 500 mb level charts 3. U.S.S.R.** V.P.S.

SOIL TEMPERATURE (551.525.2)

See: **Effects of radiation and surface temp. on sub-Alpine vegetation** (Turner), 12.7–358.

WATER TEMPERATURE (551.526)

See: **Shearing stress and heat transfer coefficient** (Uchijima), 12.7–381.

PRESSURE AND WIND

PRESSURE (551.54)

See also: **Numerical method of forecasting baric fields** (Sadokov), 12.7–306; **Arrange-
ments of tropopause and the estimated values of thickness between 200 and 300 mb**
(Sugimoto, Ono), 12.7–317.

12.7–371 550.341:55
Pasechnik, I. P., **Vozdushnye volny, voznikshie pri gobi-altaĭskom zemletriase
XII 1957 g.** [Aerial waves produced during the Gobi-Altai earthquake on Dec. 4, 1
Akademiia Nauk SSSR, Ser. Geofiz., No. 11:1689, Nov. **1959.** fig., table, 11 refs. **D**
Recorded data on the Gobi-Altai earthquake are discussed with reference to timing, dis
to the epicenter, intensity and propagation of aerial waves observed at various seismic sta
The characteristics of the aerial waves were recorded on epicentral distance of 2440 k
the electrodynamic microbarograph of the types (EDMB-1) and (EAMB-11) with the gal
metric registration. The sensitivities of these apparatuses were 2 bar/mm/n and 7 bar/n
The copy of the photorecord of the aerial waves is reproduced in the text. The absen
distinct appearance of the aerial waves and of sharply expressed anomaly of dispersion,
is essential for the powerful explosion above the ground, and also absence of excessively
period of oscillations indicate that the source of aerial waving did not have the sharp imp
moment. It is quite probable that the air waves were created by powerful disturbance
cracks on the earth core. The earthquakes were in the region of the Aleutian Islands, ori
ing far under the sea bottom with the same intensity as Gobi-Altai, but did not produce
waves. In conclusion the author suggests that extra sensitive microbarographs should b
for detection and study of the nature of aerial waves. *Subject Headings:* **1. Earthquake,
Altai region (Dec. 4, 1957) 2. Aerial waves 3. Gobi-Altai region.**—*N.P.S.*

12.7–372 551.543:551
Emerson, Mac A. (*W. B. Regional Admin. Office, Anchorage, Alaska*), **Pressure r
Yakutat, Dec. 18, 1959.** *Monthly Weather Review*, Wash., D. C., 88(1):18, Jan. **1960
DWB, DLC**—On Dec. 18, 1959 the central pressure of a storm was 974 mb and it was cen
175 mi west of Annette, Alaska. Following the surface frontal passage, the surface pr
rose 10 mb in 3 hrs at Annette and 13 mb at Sitka, but at Yakutat a rise of 18.5 mb in
and 11.1 mb in a single hour was observed. This may well be unique as the greatest h
surface pressure rise associated with an extratropical storm trough on record. *Subject Hea
1.* **Pressure rise 2. Yakutat, Alaska.**—*E.Z.S.*

12.7–373 551.543.
Reber, Grote (*Research Corp., N. Y., N. Y.*), **Atmospheric pressure oscillations
Haleakala.** *Australian Meteorological Magazine*, Melbourne, No. 26:99–103, Sept.
4 figs., 3 refs. **DWB**—Forty months of observations are analyzed. The oscillations
24 and 12 hr periods are in accord with other results. An oscillation with 8 hr period is
depicted. It relates in phase similar to sidereal time. No oscillation with a 6 hr period
be found. *Subject Headings:* **1. Atmospheric pressure oscillations 2. Haleakala, Hav**
Author's abstract.

12.7–374 551.543.1:525.624:551
Endo, H. (*Tokyo District Met. Obs.*), **On the thermal excitation of solar semidiurna
of the earth's atmosphere.** *Geophysical Magazine*, Tokyo, 29(4):557–569, March
5 figs., 3 tables, 10 refs., 27 eqs. **DWB, DLC**—The solar semidiurnal tide of the
atmosphere, which is excited by the sun's thermal action, is studied theoretically on the
of up-to-date informations of the atmospheric temperature profile. Heat energy is as
to be introduced into the atmosphere by conduction from the earth's surface, and a new
sion of ICAO standard atmosphere is used as the atmospheric temperature profile.
concluded that the thermal excitation is several times as much as the gravitational on
the conduction of heat alone cannot produce sufficient heat source which is needed to e

bservations. Some other mechanism is needed to introduce heat energy directly into igher levels. *Subject Headings:* **1. Semidiurnal atmospheric tides 2. Solar tides 3. Dy- ics of atmospheric waves.**—*Author's abstract.*

12.7–375 **551.543.3:551.510.62**

Gossard, Earl E. (*U. S. N. Electronics Lab., San Diego*), **Spectra of atmospheric scalars.** *nal of Geophysical Research*, Wash., D. C., 65(10):3339–3351, Oct. **1960.** 13 figs., 20 refs. —In Pt. 1 a wide-band spectrum of atmospheric pressure extending from periods of 1 week 2 second is shown. The various frequency ranges are discussed with particular attention to the midfrequency range. It is shown that convective activity and internal gravity es can greatly modify the normal spectral distribution at midfrequencies and a specific ple is discussed in detail. The amplitude spectrum of waves on the inversion layer is uted for this example from the surface pressure perturbations. In Pt. 2 evidence is nted indicating that the spectra of passive scalars aloft show a systematic departure from ower law distribution to be expected for a fully developed inertial subrange. The band of numbers analyzed in this report corresponds to scale sizes of 3 to 1000 ft. The 'energy' e larger scales (small wave numbers) is quite variable and depends on altitude and atmos- ic stratification. At the small scales the 'energy' is remarkably constant, and a source of ctive index variance at scales of 10 to 100 ft is indicated. Very thin layers of exceptionally mean-square fluctuation are found in regions of gradient of scalars. *Subject Headings:* **ressure variations 2. Refractive index gradients 3. Atmospheric waves.**—*Author's act.*

12.7–376 **551.543.5:551.515.81**

Rikitake, T., **On the pressure disturbance, Pt. 1.** *Journal of Meteorological Research,* yo, 10(10):826–833, Oct. **1958.** 8 figs., table, 5 refs. In Japanese; English summary p. **[Comments]** by R. Sasaki and **[Reply]** by Rikitake. *Ibid.,* 11(4):366–367, April . 9 refs. In Japanese. **DWB, DLC**—This paper investigates the pressure disturbances h occurred on 2 June 1954. Similar phenomenon is called "microbarographic depression " by Namekawa and Yamamoto, "pressure disturbance" by Isozaki, or "pressure ation" by Brunk. About 11 J.S.T. 2 June 1954, the pressure disturbance appeared al- on the 134° longitudinal line and propagated eastward at the speed 50∼60 km/hr in the stage, and at 80∼90 km/hr in the later stage. Subsequently about 16 J.S.T. another ure disturbance appeared nearly on the 137° longitudinal line, and propagated east- at the speed 80∼90 km/hr. The occurrences and movements were limited within entral and eastern parts of Japan proper, covered with an invaded frontal surface. The unt of every pressure-fall was, as far as recorded, less than 6 mm Hg, and its duration ed from a few minutes to 1 hour. Further V -shaped pressure variations were recorded he east side of the mountainous countries. At almost all the stations where pressure-falls clearly recorded, sudden increases of easterly wind velocity occurred simultaneously the pressure-falls, while at about half of all those stations, increases of temperature decreases of relative humidity took place immediately after the pressure-fall. And further- at all the stations, which were located in the raining districts and had the distinct ds of pressure-falls, there occurred also sudden drops of precipitation intensity almost ltaneously with the pressure-fall. On the tops of mountains lying under the frontal surface, records were similar to those of the plain. At the elevated stations above the frontal ce, the amount of pressure fall was slightly smaller than those of the stations in the plain. pressure disturbance treated here occurred in the area situated under the frontal surface h inclined steeply to the zonal direction. *Subject Heading:* **1. Microbarographic depres- .**—*Author's abstract.*

12.7–377 **551.547.1:551.242**

Braaten, Norman F. (*U. S. Coast and Geodetic Survey, Wash., D. C.*), **Orthometric, mic, and barometric heights.** *American Geophysical Union, Geophysical Monograph,* 4:36–39, 1959. **DWB, DLC** (QB275.C64 1958)—Orthometric, dynamic and barometric ts are defined and distinguished from each other. Comprehensive releveling programs rtaken by several European countries have revealed considerable crustal movements.

Releveling should be more extensive in order to determine the actual amount of change whic
might be more than anticipated. A panel discussion concerned itself with various indicatio
of crustal movement and with rise in sea level. BRAATEN closed the discussion with the con
ment that in leveling reference is not made to the spheroid but to the equipotential surface f
which a definite knowledge is furnished by the plumb line. *Subject Headings:* **1. Barometr**
levelling 2. Equipotential surface 3. Pendulum 4. Earth's crustal movement.—*E.Z.S.*

TURBULENCE (551.551)

See also: **Gusts and gust-load statistics** (Donely), 12.7–59; **Met. factors controlling scrub burns, Queenland** (Whittingham), 12.7–98; **Determination of atmos. turbulence spectrum from airplane sounding data** (Ivanovskiĭ, Chermisin), 12.7–238; **Determination of vertical atmos. movements from records of an accelograph installed in aircraft** (Khachatrian), 12.7–239; **Investigation of turbulence in clouds** (Gorelik, Chernikov), 12.7–250; **Overload of wind mills during gusts and squalls** (Frankfurt), 12.7–282; **Effects of topographic and met. conditions on distribution of air pollutants** (Hewson), 12.7–313; **Boundary layer turbulence** (Laĭkhtman), 12.7–327; **Atmos. diffusion** (Monin), 12.7–328; **Microscale of turbulence** (Priestley), 12.7–329; **Theory of vertically rising jets** (Schmidt), 12.7–330; **Local characteristics of surface winds in a small valley** (Yoshino), 12.7–386; **Distribution of gusts in the atmos.** (Bullen), 12.7–387; **Mean vertical wind structure, Eniwetok,** 12.7–391; **Turbulence in the upper atmos.** (Matuura, Nagata), 12.7–394; **Wave scattering due to turbulence** (Batchelor), 12.7–457.

12.7–378 551.551:551.510.5:532.

Bolgiano, Ralph, Jr. (*Cornell Univ., N. Y.*), **Turbulent spectra in a stably stratifie**
atmosphere. *Journal of Geophysical Research*, Wash., D. C., 64(12):2226–2229, Dec. 195
fig., 6 refs., 14 eqs. **DLC**—After noting the discrepancy between the predictions of turbulen
theory and the empirical evidence from radio experiments, the author suggests that this ma
be the result of modification of the turbulent spectra by the effects of buoyancy in stab
stratified layers. He points out that in such situations kinetic energy of turbulence is co
verted, over a wide range of scales, to potential energy of the resulting density deviation
that this potential energy is subsequently destroyed by the action of further turbulent mixi
and molecular diffusion and, finally, that the primary effect is to reduce the viscous dissipati
rate significantly below that which normally would be estimated on the basis of large-sca
turbulent motions .Universal forms are predicted for the kinetic energy and density fluctuati
spectra, and in the buoyancy subrange (the part of the equilibrium range that reflects t
anisotropy induced by the density gradient) the energy spectrum is found to be proportion
to $k^{-11/5}$, the density spectrum to $k^{-7/5}$. *Subject Headings:* **1. Turbulence spectra 2. Strat**
fication of the atmosphere 3. Turbulent mixing.—*Author's abstract.*

12.7–379 551.511.6:551.55

Frenkiel, François N., **Statistical study of turbulence: spectral functions and correlati**
coefficients. *U. S. National Advisory Committee for Aeronautics, Technical Memorandum* 143
July **1958.** 116 p. 93 figs., 5 tables, 18 refs., 159 eqs. Transl. by Mary L. Mahler of origin
French **Etude statistique de la turbulence. Fonctions spectrales et coefficients de corrélatio**
issued as *France. Office National d'Etudes et de Recherches Aéronautiques (O.N.E.R.A.*
Rapport Technique, No. 34, **1948. DWB** (629.1308 U585tm No. 1436)—An extensive discu
sion is given of various possible correlation functions for homogeneous and isotropic turbulenc
The logical consequence of each of several choices of such correlation functions is examined
detail. *Subject Heading:* **1. Statistical theory of turbulence.**—*NACA abstract.*

12.7–380 551.551:531

Hewson, E. Wendell and Woodbury, Max A., **Research study pertaining to low-level wi**
structure. Michigan. Univ. Engineering Research Institute, Contract DA-36-039 SC-646
Project DA-3-17-02-001 SC 1052A, Third progress report, April 1–July 31, 1956, issued Oc
1956. 13 p. 6 refs., 26 eqs. **DWB** (M51 M624re)—The effect of homogeneous and inhom
geneous isotropic turbulence on the dispersion of an unguided ballistic rocket at burnout
expressed as an integral over the wave number domain, of a quadratic form involving t
turbulence spectrum tensor (matrix). In addition, the reduction in dispersion possible

ng a set of predicting elements in aiming the rocket launcher is computed for the same cases.
e integrals involve only one real variable in the isotropic case. Work on wind-instrument
ilysis, data-reduction systems, and wind-tunnel studies has been postponed until further
ogress has been made on the central problem of an optimal statistical design. *Subject*
adings: **1. Isotropic turbulence 2. Ballistics 3. Low level wind structure.**—*Authors'*
tract.

12.7–381 551.551:551.554:551.524:551.526.8:551.481.2
†Uchijima, A. (*Div. of Met., Natl. Inst. of Agric. Sciences*), **On the shearing stress and the**
it transfer coefficient over the artificial pond. *Journal of Agricultural Meteorology*, Tokyo,
(1):9–15, July **1957.** 5 figs., 26 refs., eqs. In Japanese; English summary p. 15. **DWB**—
thor attempts to explain the dependence of shearing stress and heat transfer coefficient over
vater surface on wind velocity on the basis of the measurement of the wind and temperature
ofiles which were observed from Aug. 7–14, 1956, at an artificial pond in the fan delta of the
robe River in Toyama Prefecture. The dimensions of the pond were 3193 m^2 in area, 150
in depth, 80 m maximum horizontal side, and 0.151 m^3/sec rate of inflow; due to the sea
l land breeze, the wind velocity at 3 m height is more than 3 m/sec. The observation was
ried out using two poles 6 m high with six aspirated dry and wet thermojunctions and six
all Robinson anemometers set on these poles. In the range of wind velocity higher than
n/sec at 2 m height, the fetch was about 75 m, the water surface in the pond was found to be
aerodynamically rough surface, friction velocity and drag coefficient representing the
aracteristics of the water surface followed the logarithmic law. Thereafter, the relationship
resented in the equation showed that the heat transfer coefficient and shearing stress
creasing the roughness parameter with wind velocity) was in proportion to about 1.4 power
the wind velocity. *Subject Headings:* **1. Heat transfer coefficient 2. Heat exchange**
Toyama, Japan.—*K.C.*

12.7–382 551.551.8
Kawabata, Y. (*Japan Met. Agency, Tokyo*), **Observation of atmospheric diffusion at**
kai-mura. *Geophysical Magazine*, Tokyo, 29(4):571–582, March **1960.** 9 figs., table,
refs. **DWB, DLC**—Before the establishment of the Japan Atomic Energy Institute,
KAWABATA, S. OHTA, Y. SASAKI, T. SHIMADA and others made some diffusion experiments
Tokai-mura where it was planned to locate the Institute. A small scale experimental reactor
s considered sufficient so that the area of observations could be limited around the reactor
ation. Recently, there appeared another plan to establish a nuclear power plant on the
ne ground and it was assumed that in its normal operations it certainly would emit the
lioactivity of about 0.6 milli-curie sec^{-1} of A-41; this necessitated examining the diffusion
gases in a large area. In order to investigate the problem, a special committee of experts
s established in May 1958. At its first meeting the committee appointed the author as its
irman. This report is only an outline of the works of the committee, and many aspects of
investigations for particular problems will be reported later by each member of the com-
ttee. *Subject Headings:* **1. Atmospheric diffusion 2. Radioactivity investigations 3. Tokai-**
ra, Japan.—*Author's abstract.*

HORIZONTAL DISTRIBUTION—WIND VARIATIONS (551.552/3)

See also: **Temp. and wind frequency tables** (Rayner, *ed.*), 12.7–7; **Winds and visibility,**
Northwest Territories (Longley), 12.7–444.

12.7–383 551.552/3:627.1
Anapol'skaia, L. E., **Issledovanie vetrovogo rezhima vodokhranilishch.** [Investigation
the wind regime of water reservoirs.] *Vsesoiuznyĭ Gidrologicheskiĭ S''ezd, 3rd, Oct. 1957*
udy. Vol. 4, issued **1959.** p. 97–103. 4 figs. **DWB** (M79 985tr)—Wind velocity and
ection in the regions of Stalingrad, Kuibyshev and Tsimlyansk reservoirs were observed
m 1891 to 1913. The height of the anemometer is not as important as its free disposition.
erefore results are computed only from freely situated stations. Two frequency distribution
ves of wind velocities are computed. The computations show that at the Kuibyshev
ervoir, a wind of a velocity of 40 m per sec. has a recurrence of 1–2 times in 10 years; at the

Stalingrad and Tsimlyansk reservoirs, it occurs 2–3 times in 10 years. A short review of win
direction (with chart), of its continuity and area covered by one storm are given. *Subjec
Headings:* **1. Wind regime over reservoirs 2. Wind velocity 3. Stalingrad, Stalingra
Region, U.S.S.R. 4. Kuibyshev, Novosibirsk Region, U.S.S.R. 5. Tsimlyansk, Rosto
Region, U.S.S.R.**—*J. Němec.*

12.7–384 551.552:551.558:551.509.31

Raethjen, Paul, **Über den "Scale"—Unterschied vertikaler und horizontaler Ströbewe
gungen.** [Scale differences between vertical and horizontal motion of perturbations.] *Bei
räge zur Physik der Atmosphäre*, Frankfurt a.M., 32(3/4):257–264, **1960.** 2 refs., 8 eqs. Ger
man, English and French summaries p. 257–258. **DWB, DLC**—From the dynamical viewpoin
on order-of-magnitude, limit exists between the "small-scale" or "short-period" flow pattern
which are independent of the Coriolis force and the "large-scale" or "long-period" flow pattern
whose development is primarily determined by the Coriolis force. These limits are, wit
respect to time, approximately half the inertial period (at temperate latitudes roughly 8 hrs)
with respect to dimensions approximately the diameter of the inertial circle with "normal
inertial velocity. In temperate latitudes this diameter is approximately 300 km. It i
remarkable that well-organized synoptic aerological nets have approximately this kind o
space-time mesh, namely 300 km in space, 12 hrs in time, with the tendency to shorten it t
6 hrs. It follows that in the synoptic weather service the effects of the Coriolis force receiv
considerable attention (in horizontal maps), but not the small scale and short-period processe
involving vertical mass re-adjustments. The latter are ascribed (as "frontal" processes) to
"discontinuous" boundary between "airmasses." This scale difference between horizontal an
vertical mass motions is in the atmosphere predetermined by their topological condition. I
extends horizontally over several thousand km, vertically (i.e. for vertical readjustments); it i
confined within the limits of the troposphere of 10 km. By means of the dynamic equations i
is shown that periodic and aperiodic "perturbation motions" (that is motions without hydr
static and gradient wind balance) are completed on less than three hours if they consist o
vertical displacements because of a disturbance of the density field. But their period must b
at least of the order of magnitude of the inertia period (12 to 36 hours) when they are due to
disturbance of the wind field. Thus it is shown that thermodynamic cyclic processes whic
gain mechanical (kinetic and potential) energy by heat exchanges are predominantly "smal
scale" and of "short" duration. They remain, therefore, hidden on the synoptic chart
Hence, the synoptic meteorologist can find (without theoretical speculations) the "cause" o
the weather developments only in disturbances of the field of flow, not in heat effects. This
especially true for the jet stream whose disturbation the author has discussed elsewhere i
more detail. *Subject Headings:* **1. Flow patterns 2. Large scale forecasting 3. Perturbatio
4. Synoptic analysis.**—*Author's abstract.*

12.7–385 551.588.2:551.553(9

Gilbert, J. (*Météorologie Nationale, Paris*), **L'influence catabatique sur les variations d
vent au sol en Terre Adélie.** [Katabatic influence on ground wind variations in Adélie Land
La Météorologie, Paris, Ser. 4, No. 57:113–125, Jan./March **1960.** 7 figs., 2 tables, 7 ref
English, French, Spanish and Russian summaries p. 113. **DWB**—The comparison of t
monthly means of wind velocity at the Dumont d'Urville base with those at the coast of t
Antarctic continent and the diurnal variation of the wind velocity at Dumont d'Urville duri
a part of the year, reveal an accentuated katabatic influence at this station. The amplitu
is comparable to that observed in the sector of Mirny. The katabatic effect, both at Dumo
d'Urville and on the plateau, between d'Urville and Charcot, is in good agreement with th
derived theoretically from the values of the main factors on which it depends, i.e., slope of t
surface and the temperature inversion. *Subject Headings:* **1. Wind data 2. Wind veloci
distribution 3. Orographic effects on wind 4. Temperature inversion-wind profile relatio
ships 5. Adélie Land, Antarctica.**—*Author's abstract.*

12.7–386 551.588.2:551.553.12:551.551.

*Yoshino, Masatoshi (*Dept. of Geog., Tokyo Kyoiku Univ.*), **Local characteristics of surfa
winds in a small valley.** *Tokyo. Univ. of Education. Geographical Institute, Section
Scientific Reports*, 5(46):129–151, March 20, **1957.** 6 figs., 2 plates (photos), 7 tables, 13 ref

eqs.—A study of the local characteristics of surface winds with the object of (1) explaining haracteristics of the surface winds as affected by the micro-topography in a small valley nd (2) observing the conditions of wind turbulence in a hilly terrain. Observations were nade during May, 1952 in an area of about 16 sq km located 10 km south of Numazu City, hizuoka Prefecture, Japan. On the basis of preliminary observations, using Mori-type nemographs, it was concluded that in order to gather representative data in the main observa- ons, observational points should be selected in a line either parallel or perpendicular to the dge and valley bottom. Preliminary observational data showed that at any given observa- on, prevailing wind direction shifted further clockwise in descending from ridge points to the alley bottom points. Main observations were made using Mori-type anemographs and akaasa-type anemometers along the ridge, upper and lower valley slope, and valley bottom. rom detailed data-tables and diagrams it is concluded that (1) wind characteristics are more nfluenced in the valley bottom than on the ridge or valley slope by local topographical and ther features, and (2) independent of wind velocity, intensity of turbulence has great devia- ons, reaching its maximum value at more than 1.0. *Subject Headings:* 1 **Wind systems in alleys 2. Wind measurement instruments 3. Terrain effects on wind.**—*A.J.M.*

12.7–387 551.553.6 551.551:551.554

*Bullen, N. I., **Distribution of gusts in the atmosphere: an integration on U. K. and U. S. ata.** *Great Britain. Aeronautical Research Council, Technical Report*, No. 419, **1959.** 10 p. figs. (fold.), 4 tables, 20 refs., 2 eqs. **DWB** (G29.1308 G786c)—A comparison is made of ritish aircraft accelerometer records converted to gust velocities by the method of ZBROZEK nd U. S. gust accelerations obtained from the N.A.C.A. V.g.h. recorder. In general, there is ood agreement between the two sets of data. The British records were previously collected nd summarized by BULLEN (1956) and pertain to air routes between London and Africa nd east and southeast Asia, as well as European air routes; the altitude range is from near the round (climb and descent) to a height of 34,000 ft (Comet cruise level). The U. S. data were rom various N.A.C.A. reports, 1952–57, and pertain largely to transcontinental flights at levels p to 25,000 ft. Frequency distributions of the two sets of data are shown in tables giving the umber of gusts exceeding 10, 15 . . . 45 ft/sec, and are also plotted on logarithmic paper. he occurrence of gusts in relation to altitude is demonstrated with separate data for conditions f cruise, climb, and descent. *Subject Headings:* **1. Gust frequencies 2. Gust variation with eight.**—*R. S. Quiroz.*

12.7–388 551.553.6(474.5)

Ol'shauskas, S. K., **Veroiatnost' skorosti vetra po gradatsiiam dlia razlichnykh napravleniĭ a territorii Litovskoĭ SSR.** [Graduated wind speed probabilities for various directions in Lithuania.] *Lietuvos TSR Mokslų Akademija. Geologijos ir Geografijos Institutas, Moksliniai Pranešimai, Vol. 3, Geofizika, Hidrologija*, issued Vilna, 1956. p. 109–110. **DWB**—The requency of wind velocities of magnitudes ranging from 0–1, 2–5, 6–10, 11–15 and above 5 met/sec and for different directions was investigated at four weather stations in the Lithua- ian S.S.R. by means of a weather vane. In the text the author presents numerical data on he distribution of wind velocities and associated directions for Jan., April, July and Oct. It s shown that weak winds (0–5 met/sec) predominate over the Lithuanian S.S.R. since the aximum percent of wind velocities exceeding 15 met/sec falls to 5% in October for all direc- ions along the coast and to 3% in January in the interior. *Subject Headings:* **1. Wind speed robabilities 2. Lithuanian S.S.R.**—*I.L.D.*

VERTICAL DISTRIBUTION (551.554)

See also: **Met. factors controlling scrub burns, Queensland** (Whittingham), 12.7–98; **Measurement of vertical winds** (Thornthwaite, Superior), 12.7–242; **Shearing stress and heat transfer coefficient** (Uchijima), 12.7–381; **Distribution of gusts in the atmos.** (Bullen), 12.7–387.

12.7–389 551.554:551.558:551.515.41:551.578.7

†Newton, Chester W. (*Dept. Met., Chicago, Ill.*), **Morphology of thunderstorms and hail- torms as affected by vertical wind shear.** *American Geophysical Union, Geophysical Mono-*

graph, No. 5:339–347, **1960.** 7 figs., 24 refs., 5 eqs. **DWB, DLC**—Within convective clouds imbedded in a current with pronounced vertical shear, horizontal velocities are considerably different (1 to 10 m/sec or more) from environment winds, because of intense vertical transfer of momentum inside the cloud. Pressure fields induced by relative motions tend to promote new cloud growth on the downshear flank of a large convective system containing both updrafts and downdrafts. Physical analysis of the forces, with the aid of experimental analogy, indicates that the induced pressure field is quantitatively capable of triggering convection and that it significantly augments vertical accelerations in the newly formed cells. Possible influences on growth and distribution of large hail relative to the main body of a storm, are discussed with examples. *Subject Headings:* **1. Thunderstorm morphology 2. Hailstorm morphology 3. Vertical wind shear 4. Cloud system structure 5. Vertical motion.**—*Author's abstract.*

12.7–390 551.554:551.511:532.5

Swinbank, W. C. (*Div. of Met. Physics, Victoria, Australia*), **Wind profile in thermally stratified flow.** *Nature*, London, 186(4723):463–464, May 7, **1960.** 2 refs., 9 eqs. **DWB**—An attempt is made to show that it is possible to derive a formal solution expressing the variation of wind with height in terms of the shearing stress and the vertical heat flux associated with the thermal stratification. Present indications are that the law of wind variation contained in equation

$$V_2 - V_1 = \frac{V^x}{K} Ln \left[\frac{1 - \exp (Z_2/L)}{1 - \exp (Z_1/L)} \right]$$

promises to be capable of universal application. *Subject Headings:* **1. Wind profiles 2. Thermally stratified flow.**—*E.K.*

12.7–391 551.554:551.551(968.1)

*U. S. Joint Task Force Seven, **A study of the mean vertical wind structure over the Eniwetok Proving Ground area.** Its *JTFMC TP*-15, **1959.** 65 p. fig., 6 plates (fold.), numerous tables, 9 refs. **DWB** (M58 U585st)—The data for this study were obtained during April through July 1958 from 16 stations located as near as possible along a N-S line through the Eniwetok Proving Ground (EPG). Winds for all levels reported were resolved into zonal and meridional components (U and V). It was decided later that semimonthly means would adequately represent the variations in the primary wind currents during the period. Further since the mean flow was predominantly zonal, the analysis of V components did not appear necessary. The mean U and V winds are tabulated and only mean U components are graphically represented. The details of analysis and the primary features of the wind flow are described. In conclusion it is stated that any horizontal analysis of the wind in the tropics must carefully and continually take into account the unique vertical wind structure. *Subject Headings:* **1. Vertical wind structure 2. Eniwetok, Marshall Is.**—*I.S.*

SPECIAL WINDS (551.555)

See also: **Thermal balance of Golodnaya Steppe during Ursat'ev winds** (Zuev, Pavlov), 12.7–353; **Cold wave, Europe** (Verdier), 12.7–449.

12.7–392 551.555.3

Laĭkhtman, D. L. and Rusin, N. P., **O meteorologicheskom kriterii sukhoveia.** [Meteorological criterion of the sukhovei or hot dry winds.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 69:65–70, **1957.** 3 figs., 3 tables. **DLC**—Complex meteorological conditions in which the loss of water by vegetation exceeds certain critical conditions is defined by the word "sukhovei" (dry wind). The intensity of this phenomenon depends upon each of the four meteorological factors i.e., air humidity and temperature, wind velocity and radiation balance of an active surface and also upon their combinations. An emperical correlation of these factors was not found for the definition of the intensity of the "sukhovei." However, the authors offer some graphical relationships (nomogram) of these factors, plotted from actually observed and tabulated data during the "sukhovei" for air temperature, relative humidity, deficiency on the transpiration of moisture, average wind velocity and computed lues for superheat of air. The separate and combined effects of all these factors on total tensity of the "sukhovei" can be evaluated with analysis of the nomograms. *Subject Heading:* **Sukhovei.**—*N.P.S.*

12.7–393 551.555.8:551.45(764)

Elser, Harry L., **A desert dust storm strikes El Paso, Texas.** *Weatherwise*, Boston, 2(3):115–116, June **1959.** 4 figs., 2 refs. **DWB**—Desert dust storms play an annual role in e weather scene over the desert plateau of the southwestern section of the U. S. each spring. hese are caused by dry, high level thunderstorms at a time when the westerly circulation of inter is giving way to easterly for the summer. Explanation of this type of storm can begin ith the mature stage when the down draft reaches the ground to establish a micro-cold front. nce there is little rain to dampen the desert floor, the downdraft winds stir up large clouds dust lasting several hours. A storm which occurred on June 28, 1957 in El Paso, Tex., and hich lasted for four hours during which the visibility was zero, is photographically presented. t is concluded that the suddenness with which these storms strike and their severity make them weather phenomenon to be reckoned with by the inhabitants of the area. *Subject Headings:* **Desert dust storms 2. El Paso, Tex.**—*I.S.*

WIND EFFECTS (551.556)

See: **Salty wind damage to transmission lines** (Kikuchi, Nagayama), 12.7–109; **Utilization of winds in the Sevan Basin** (Bagdasarian), 12.7-110; **Relative action of swell and wind** (Larras, Claria), 12.7–200; **"Loewe phenomenon," Adélie Land** (Valtat et al.), 12.7–343.

UPPER AIR WINDS (551.557)

See also: **Reversal of stratospheric winds, N. America** (Belmont), 12.7–6; **First met. rocket-firing network,** 12.7–78; **Met. measurements and field program of Project Jet Stream** (Endlich, Rados), 12.7–236; **Met. ordnance report, Operation Hardtack, 1958,** 12.7–258; **Numerical assessment of divergence at Singapore** (Bryant), 12.7–271; **Distribution of wind and temp. in lower stratosphere** (Panofsky), 12.7–318; **Non-adiabatic cooling in jet stream region** (Danielsen, Reiter), 12.7–325; **Circulation at 500 mb level, N. Hemisphere** (Bayer), 12.7–336; **General circulation** (Defant), 12.7–347.

12.7–394 551.557:551.551.5:551.510.535

Matuura, Nobuo and Nagata, Takesi (*both, Geophys. Inst., Tokyo Univ.*), **Turbulence in e upper atmosphere.** *Japan. Science Council. Ionosphere Research Committee, Report of onosphere Research in Japan*, 12(2):147–159, June **1958.** 6 figs., 15 refs., 36 eqs. **DWB**—n attempt has been made to understand the observed properties of ionospheric irregularities om the viewpoint of turbulent theory. The theoretical interpretation made here is on the asis of a theory that the atmosphere as a whole is in a state of equilibrium under the influence of avity. The results give scales of the largest and the smallest irregularities as being of the der of 1 km and 30 m, respectively, for the level of 100 km, and of the order of 30 km and km respectively, for the level of 200 km. Further it is concluded that random velocities of e largest and the smallest irregularities are of the order of 30 m/sec and 8 m/sec, respectively, r the level of 100 km, and of the order of 300 m/sec for both the largest and the smallest regularities at level of 200 km. These results can well explain the observed facts in a unified ew of upper atmosphere turbulence. *Subject Heading:* **1. Upper air turbulence.**—*Authors' stract.*

12.7–395 551.557.3(522.1)

Ura, T., **The variation of upper wind and the durability of strong wind at Itazuke.** *Journal Meteorological Research*, Tokyo, 10(11):943–951, Nov. **1958.** 9 figs., 10 tables. In Japanese. **WB, DLC**—Using aerological observations, this study has presented the variations of upper ind and strong wind at 700 mb at Itazuke for 1953–1955. The analytical chart shows the llowing features: vertical distribution of mean wind speed by both month and height (up to km), increasing rate of wind speed at various heights, monthly frequency of strong wind at

3 km height with 25 m/sec and its duration, relation between strong wind and pressure distribution. The duration of strong wind was maintained longer by monsoon pattern than by cyclone and front or by typhoon and migratory anticyclone. *Subject Headings:* **1. Upper air wind variations 2. Itazuke, Japan.**—*K.C.*

12.7–396 551.557.32:551.513.2(265/6)

*U. S. Joint Task Force Seven, **Mean monthly upper tropospheric circulation over the Tropical Pacific during 1954–1959. Vol. 1, 1958.** Issued May **1960.** 17 p. of text. numerous tables, 9 refs. **Vol. 2, 1959.** Issued Aug. **1960.** 15 p. of text. 24 plates, numerous tables, 9 refs. **Vol. 3, 1957.** Issued **1961.** 15 p. of text. All vols. 37×27 cm. 24 plates, numerous tables, 9 refs. (Its *JTFMC* TO-19) "First [3 Vols.] of a planned series of six." **DWB**—The first volume deals with the upper tropospheric windflow over the Eniwetok Proving Ground. This area was chosen by the Joint Task Force Seven Meteorological Center due to the increased data availability resulting from Operation Hardtack in April-July 1958, and the optimum data coverage analyzed in 1958 from the rawin network. The 200 mb level with vertical cross-section of the zonal winds along 140°E and 165°E rendered a three-dimensional picture of the atmosphere for constructing monthly means. Data processing method, chart analyses including typhoon circulation, synoptic description with the terminology of trade winds, equatorial easterlies, upper westerlies, mid-Pacific drought, Besson westerlies, Krakatoa easterlies and axis of the sub-tropical ridge, and the seasons, are described in the text. The mean *U*-components along 140°E and 165°E and the mean streamlines are represented on the plates, supplemented by tables of sample mean monthly tabulations for Wake Island for May 1958 and of a station nomenclature and by a station locator map. The mean monthly tabulations for each of the 39 stations complement the work. The synoptic-climatical approach as well as the utilization of streamline analyses are considered as the most promising means for forecasting potential. Recognition of the basic circulation processes in the mean, leading to an understanding of their daily changes, provide a basis for forecast. The use of the space cross-section for operational work and the use of streamlines for kinematic analyses to 35°N and south of the equator is suggested. Results of a further analysis of the upper troposphere flow at the 200 mb level under excellent observational conditions are presented in Vol. 2. The outstanding feature of the first two years, 1958 and 1959, is the marked lack of inter-annual variability. The one major exception is the pronounced trough during the summer of 1958 in the Japan area, contrary to the strong and persistent anticyclonic flow. In the stratosphere at low latitudes, however, relatively strong westerlies with easterlies above, changed gradually to the opposite from Sept. 1958 to Sept. 1959. There are similar tables and maps as in Vol. 1. The pattern of the previously published volumes is followed for Vol. 3. The decrease of data had been compensated by the experience gained and patterns established with the better data of 1958 and 1959. The observational equipment, the maximum of upper air networks and the concurrency of the IGY made the period covered by this volume the best for analysis for which the 200 mb level proved to be the most representative of the upper tropospheric flow in tropical regions. Comparison of the three years show a probable correlation between the upper tropospheric flow patterns and the variation in the equatorial stratosphere. This phenomenon justified the construction of monthly means for the entire period. The combination of all data into one mean for each month was considered to be of advantage. *Subject Headings:* **1. Upper tropospheric circulation 2. Forecasting techniques 3. Tropical Pacific.**—*O.T.*

VERTICAL MOTION (551.558)

See also: **Vertical velocities in upper troposphere and lower stratosphere** (Orlova), 12.7–240; **Convective processes** (Hitschfeld), 12.7–251; **Cold front precip., central European S.S.S.R.** (Vetlov, Petrenko), 12.7–304; **Circulation systems, Tibetan Plateau** (Yang, Lo), 12.7–335; **Vertical and horizontal motion of perturbations** (Raethjen), 12.7–384; **Morphology of thunderstorms and hailstorms** (Newton), 12.7–389.

12.7–397 551.558:551.513

Oi, Masamichi (*Osaka Gakugei Univ.*), **Steady topographical perturbation of a zonal current in the Northern Hemisphere.** *Meteorological Society of Japan, Journal, Ser. 2,* 37(5):

37–146, Oct. 1959. fig., 2 tables, 12 refs., 15 eqs. Japanese summary p. 146. **DWB, DLC**—he periodic solution of the governing differential equation of steady topographical perturbaon of a zonal current, which was obtained in previous papers without taking into account titudinal variation of the Coriolis parameter, is applied to compute the streamlines of zonal irrent over the Northern Hemisphere zone by zone from 75°N to 15°N in comparison with ie actual Normal Contour Chart. Distributions of horizontal velocity divergence and ertical component of vorticity accompanied by these computed streamlines are discussed gether with La Seur's deviation of circulation center. *Subject Headings:* **1. Zonal currents** **Perturbations 3. Northern Hemisphere.**—*Author's abstract.*

12.7–398 551.558.21:551.43

Wirth, Endre, **Léghullámok hegyek fölött.** [Air waves over mountains.] *Időjárás,* ludapest, 63(1):47–51, Jan./Feb. 1959. 2 figs., eqs. **DLC**—World literature on mountain aves is reviewed. The work of Queney, Scorer and Förchtgott is considered in some etail. *Subject Headings:* **1. Orographic effects 2. Mountain waves.**—*G.T.*

AQEOUS VAPOR, HYDROMETEORS AND HYDROLOGY

HUMIDITY (551.571)

See: **Statistical method for estimating mean relative humidity** (Sellers), 12.7–245; **Electrolytic water vapor detector for balloon measurement of water content of atmos.** (Waters), 12.7–292; **Predicting the relative humidity field** (Shvets), 12.7–307.

EVAPORATION—EVAPOTRANSPIRATION (551.573)

See: **Plant-water relationships** (Kramer, Russell), 12.7–93; **Formula for obtaining evaporation amount** (Demiańczuk), 12.7–224; **Large-sized recording evaporimeter** (Uehara), 12.7–225; **Evaporation pan measurements** (Szesztay), 12.7–289; **Drought in western Japan from viewpoint of potential evapotranspiration** (Kusakabe), 12.7–414.

CONDENSATION (551.574)

See also: **Drop size distribution in clouds** (Singleton, Smith), 12.7–291; **Polarization technique for seeing through fogs** (Nathan), 12.7–360; **Nuclei of ice crystals** (Itoo), 12.7–417.

12.7–399 551.574.11:551.510.42:551.590.25

Kline, Dwight B. and Brier, Glenn W. (*U.S.W.B.*), **A note on freezing nuclei anomalies.** *Ionthly Weather Review,* Wash., D. C., 86(9):329–332, Sept. 1958. 2 figs., 2 tables, 24 refs. q. **DWB, DLC**—Daily freezing nuclei observations taken in the Washington, D. C., area uring the first 3 months of 1958 showed large fluctuations in time relative to probable observaonal uncertainties. Anomalous values were detected around the January dates predicted by ie meteoritic dust hypothesis. However, subsequent "peaks" do not appear to be associable ith any known major meteor streams. A composite analysis of the dates of dominant peaks similar observations at a number of other locations since 1954 tends to confirm the existence singularities in January which are statistically highly significant. *Subject Headings:* **Freezing nuclei anomalies 2. Meteoric dust.**—*Authors' abstract.*

12.7–400 551.574.11

Nolan, P. J. and O'Toole, C. P. J., **The condensation nuclei produced by point discharge.** *eofisica Pura e Applicata,* Milan, 42:117–126, 1959. 3 figs., 3 tables, 8 refs. German and nglish summaries p. 117. **DLC**—The properties of condensation nuclei generated at a metal oint corona discharge have been examined. The threshold voltages for nucleus production nd for small ion production are the same. The fraction of the nuclei which is charged is itially small and becomes virtually zero after a few seconds. It is demonstrated that in the on-uniform field near the point there is a force on the nuclei driving them to the point. From determinations of the diffusion coefficient, it is tentatively concluded that a portion at leas of the nuclei are originally of molecular size. No satisfactory explanation has been found fo certain anomalous features of the variations in size and in concentration of the nuclei wit time after production. *Subject Heading:* **1. Condensation nuclei production by point discharge** —*Authors' abstract.*

12.7–401 551.574.1

O'Connor, T. C.; Sharkey, W. P. F. and O'Brolchain, C., **On condensation nuclei produce at heated surfaces.** *Geofisica Pura e Applicata*, Milan, 42:109–116, **1959.** 5 tables, 9 refs German and English summaries p. 109. **DLC**—An investigation of heated surfaces of glass metal and oil as sources of condensation nuclei, is reported. Below a certain transition temperature the nucleus production is of a temporary nature and decreases to zero with the continued heating of the surface. Above this temperature, however, the nucleus production doe not change with time. The transition temperature varies with the material of the surfac and is not always associated with the onset of incandescence. The nuclei produced at th lower temperatures have a radius of about 10^{-5} cm and on production are mainly uncharged Electric light bulbs can produce appreciable numbers of these nuclei. *Subject Heading* **1. Nuclei production on heated surfaces.**—*Authors' abstract.*

12.7–402 551.574.11:551.510.42:

Telford, J. W. (*Commonwealth Scientific and Industrial Research Org.*), **Freezing nucle from industrial processes.** *Journal of Meteorology*, Boston, 17(6):676–679, Dec. **1960.** 3 figs. 5 refs. **DWB, DLC**—A series of flight observations were made along the east coast of Australi near industrial plants in the vicinity of Australia. Each of the series of flights, their experimental procedures and measurements are described. On the basis of nuclei counts it is suggested that a proportion of the freezing nuclei in the atmosphere comes from certain types o industrial activity. The smoke from a steel furnace was identified as a prolific source bu other industries probably have little influence on the nucleus count, and it is quite possibl that some may produce inhibiting agents. It is pointed out that these measurements wer taken at −24°C so that about 10 or so crystals were usually sampled. Since most natura clouds are already nucleated at −24°C, the effect of these nucleus concentrations on rainfal depends on the relationship between counts at warmer temperatures and those observed. I concentrations are warmer temperatures increase in step with these observations, it seem reasonable to expect more rain downwind from industrial concerns than would otherwise fal if the smoke was entirely inactive. *Subject Headings.* **1. Freezing nuclei 2. Freezing nucle sources 3. Industrial meteorology 4. Australia.**—*E.Z.S.*

12.7–403 551.574.1

*Todsen, M., **Some measurements of drop size distribution and concentration in clouds an fogs.** *Norske Videnskaps Akademi i Oslo. Institutt for Vaer- og Klimaforskning, Publicatio and Reports*, No. 1, 1957/1958, issued **1958.** 16 p. 2 figs., 7 tables, 6 refs. **DWB** (M(055 N863p)—Norwegian measurements of samples of fog and cloud drops as taken with a cascad impactor at Blindern, Oslo (90 m.a.s.) Tryvasshogda (529 m.a.s.) and at Fanaraken (2,06 m.a.s.) during 1957–1958, are discussed. Very small droplets were present in nearly a samples. It was also observed that drop size spectra frequently deviate from the commo logarithmic normal distribution and occur with two or three maxima. A cellular structure evident in calm air fog. The search for ice nuclei was not so successful, because of method logical limitations. The results are tabulated. *Subject Heading:* **1. Drop size distributio** —*W.N.*

12.7–404 551.574.4

Angus, D. E. (*Div. of Met. Physics, CSIRO, Melbourne*), **Measurements of de** *UNESCO, Arid Zone Research*, 11:301–303, pub. **1958.** eqs. French summary p. 303. **DW** (M84 US8cl)—Measurements of dew made on winter nights in Griffith, New South Wal and near Melbourne by means of a sorption method and Duvdevani's method, are reporte Effect of orientation of surface, dew attraction by plants projecting above a homogeneo surface, effect of differences in leaf temperature, the persistence of dew, and the effects of th rious atmospheric factors and soil moisture upon dew formation are discussed on the basis results of the measurements. *Subject Headings:* **1. Dew measurements 2. Dew formation Griffith, New South Wales 4. Melbourne, Australia.**—*G.T.*

FOG (551.575)

See: **Foggy period with temps. below freezing** (Ross), 12.7–361.

CLOUDS (551.576)

See also: **Investigation of turbulence in clouds** (Gorelik, Chernikov), 12.7–250; **Drop size distribution in clouds** (Singleton, Smith), 12.7–291; **Astron. methods in hist. climat.** (Link, Linková), 12.7–448; **Cloud discharge preceding first ground stroke** (Takeuti et al.), 12.7–454; **Charge generation during riming in supercooled clouds** (Kuettner, Lavoie), 12.7–456.

12.7–405 551.576.4:551.593.55

Dessens, Jean, **Mesure de l'altitude des nuages par observation de leur éclairement pusculaire.** [Measuring the altitude of clouds, through observing their twilight il- nination intensity.] *Académie des Sciences, Paris, Comptes Rendus*, 248(16):2367–2369, ril 20, 1959. **DWB, DLC**—Determination of the altitudes of clouds through a method sed on the changes in illumination intensity of clouds at sunset. It requires only one servation station. At sundown cloud base is illuminated by the Sun when it sets at a tain point (start of illumination); this does not occur when the Sun goes down at another int (end of illumination or extinction). Description of 3 processes, based on the same thod, in order to compute the altitude of clouds by means of the duration of relighting, e hour of relighting or by means of the hour of extinction is given. The author applies the rections to atmospheric refraction, and illustrates his methods by a practical example. *bject Headings:* **1. Cloud height measurement techniques 2. Twilight illumination in- sity of clouds.**—*A.V.*

12.7–406 551.576.5:532.59:778.35(44)

Scorer, R. S., **A pile of plates.** Photostat of separated pages from *The Aeroplane*, London, (2374): 309–310, March 1, 1957. 6 figs. **DWB** (M76.12 S423pi), **DLC** (TL501.A552)— e title is an English translation of the French term given to wave clouds when they are cked one above the other. The present paper discusses this phenomenon and shows a ture depicting a view of such wave cloud formation over Mont Ventoux. The picture was en by Ernst Frowein from near the top of a soaring flight in which he reached approxi- tely 30,000 ft on Jan. 26, 1957. The background and other particulars of Dr. Frowein's ht are given and attention is drawn to the increasing interest in wave clouds in France. merous graphical representations illustrate the text. *Subject Headings:* **1. Wave clouds Cloud photography 3. Mont Ventoux, France.**—*I.S.*

PRECIPITATION (551.577)

See also: **Prelim. investigations for an agroclimat., German Democratic Republic** (Mäde), 12:7–79; **Met. factors controlling scrub burns, Queensland** (Whittingham), 12.7–98; **Study of drought** (Koshelenko), 12.7–234; **Determination of intensity of rain** (Zalesskiĭ 12.7–246; **Convective precip. as revealed by radar obs., Texas, 1958–59** (Clark), 12.7–249; **Radar detection of local rainfall, Utsunomiya** (Ōtsuka, Ōnuki), 12.7–252; **Operation and results of Project Pluvius** (Bergeron), 12.7–293; **Rainfall variations over a small area** (Oliver), 12.7–296; **Cold front precip., central European U.S.S.R.** (Vetlov, Petrenko), 12.7–304; **Extreme rainfall depths** (Hershfield, Wilson), 12.7–338; **Daily ground inversion layers, Odessa** (Perelet), 12.7–368.

12.7–407 551.577:551.579:551.481.1

Borhidi, Attila and Komlódi, Magda (J.), **A csapadék- és vízszint-ingadozás összefüggése aláta-tő természetvédelmi területén.** [Correlation of precipitation and water level variations in Lake Baláta.] *Időjárás*, Budapest, 63(4):225–229, July/Aug. **1959.** Hungarian an Russian summaries p. 225. **DLC**—Lake Baláta, situated in southern Trans-Danubia at a air-distance of about 50 km south of Balaton, is a natural park of rich vegetation and anima life. The lake receives its water entirely from atmospheric precipitation. Close correlatio exists between water level oscillations, drying up and refilling, as well as between the precipita tion of years of different climatic types. *Subject Headings:* **1. Water level-precipitatio relationships 2. Lake Baláta, Hungary.**—*O.T.*

12.7–408 **551.515.1**:551.**577**(54

Parthasarathy, K., Veeraraghavan, K. and Prakash, Ved (*all, Met. Office, New Delhi*) **Area-intensity relationship of storm rainfall.** *Indian Journal of Meteorology and Geophysics* New Delhi, 11(1):19–24, Jan. **1960.** 3 figs., table, 6 refs., eqs. **DWB, DLC**—From th analysis of rainfall distribution of a number of storms in different parts of India, the area intensity relationship of storm rainfall has been derived as $Y=100-C\sqrt{A}$ where Y is th percentage ratio of the rainfall over an area A surrounding the storm centre to the maximu rainfall at center of storm and C is a constant varying with geographic location, but withi narrow limits. A possible use of this relation in the rainfall intensity frequency computation for local drainage designs is suggested. *Subject Headings:* **1. Storm rainfall distributio 2. Storm rainfall intensity 3. India.**—*Authors' abstract.*

12.7–409 551.**577.**

Rigg, J. B. (*Watford Grammar School*), **A statistical study of the distribution of rainfal over small and medium-sized areas.** *Weather*, London, 15(11):377–379, Nov. **1960.** 2 table **DLC** (QC 851.W4)—Nine raingages were placed in a square box and readings from the variou gages were taken at intermittent intervals. The arithmetic mean of each group of observation was calculated and the difference from the mean for each gage was obtained as a percentage The standard deviation (σ) was found to be related to the mean of the rainfall, in millimeter by the equation

$$\log_{10}\sigma=-0.38\log_{10}\bar{R}+0.65$$

A further network of gages was set up in an area of approximately 27 square meters. Usin this network of gages and other observation it was found that a similar equation to (1) coul be fitted. *Subject Heading:* **1. Rainfall distribution 2. Statistical study of rainfall.**—*R.B.*

12.7–410 551.**577.2**(521.16):551.**579.**

Shimada, M.; Kobayashi, T. and Ichikawa, M., **Summary of the report of rainfall runo in the Tadami River Upper Basin at Fukushima Prefecture in summer 1953.** *Journal Meteorological Research*, Tokyo, 7(9):607–608, Oct. **1955.** 3 figs., table. In Japanese. **DW DLC.** Also in: *Sendai, Japan. Central Meteorological Observatory, Bulletin of the Meteorologic Society for Research of Tohoku District*, 9(1):85–86, Nov. **1955.** 3 figs., table. In Japanes **DWB**—Area of investigation (Fig. 1) shows a basin in which the main flow is from the Tada River (1816 km^2); five minor basins are included in the area. Four types of precipitation a indicated in the upper basin according to areal rainfall frequency and pressure distributio mean rainfall has been calculated in each water basin. For precipitation and outflow hydrograph drawn according to the Thiessen method shows the base flow, surface runoff, inte flow and ground water (Fig. 2). There was a close correlation between the amount of run and the conditions in the 700 mb and 850 mb layers. *Subject Headings.* **1. Rainfall run investigations 2. Precipitation distribution 3. Tadami River Basin, Japan.**—*K.C.*

12.7–411 551.**577.31**(67

*Thompson, B. W., **The diurnal variation of precipitation in British East Africa.** *E Africa High Commission. Meteorological Department, Technical Memorandum* No. 8, 195 70 p. numerous figs., 27 tables, 5 refs. **DWB, DLC**—Precipitation variations at 27 Ea African meteorological stations have been studied. Tables and charts for each of these statio are included. Most of the inland stations show a continental pattern of diurnal variation rainfall. Over much of inland Tanganyika and southern Kenya cumulus clouds that fo during the morning often disperse at about midday, when it would be expected to reach aximum. *Subject Headings:* **1. Diurnal precipitation variations 2. Tanganyika 3. Kenya.** *N.N.*

12.7–412 **551.577.37:551.579.4:627.8**(282.253)

Tucker, G. B. (*Meteor. Office, Harrow*), **Some meteorological factors affecting dam design d construction.** *Weather*, London, 15(1):3–13, Jan. **1960.** 5 figs., 5 refs. **DWB**—The thor surveys briefly the ways in which an engineer takes into account both weather and mate (precipitation, length of dry season, etc.) when designing the structure and planning e operation of a dam. This is followed by a discussion of the various methods of estimating e extreme floods that can be expected at a proposed dam site. These methods are as follows: the direct observation of river discharge or river level and the application of a safety factor the largest observed floods; if discharge records have been made over a period of many ars at various sites on the river in the area of interest, extreme floods are determined by otting the highest recorded discharge at each site against the catchment area above the site; a statistical analysis of the maximum floods observed in past years; the maximum daily scharges, x, for each year at one site are arranged in order of increasing magnitude and are mbered from l to n; if m is the serial number of a discharge, then $y = -\log(-\log m/n+1)$ calculated for each discharge; in the limit for large values of n, the curve $y=y(x)$ is a straight e and the linear asymptote obtained graphically from large values of x is a sufficiently curate extrapolation; 3) the employment of probable maximum precipitation studies which e then used to obtain the probable maximum flood. The applications of such a study of the ver Jhelum catchment in the foothills of the Himalayas in the north of West Pakistan is ustrated. *Subject Headings.* **1. Precipitation extremes 2. Maximum flood discharge lculations 3. Dams 4. Jhelum River, Pakistan.**—*I.L.D.*

12.7–413 **551.577.38**(522)

Kusakabe, M. (*Fukuoka Dist. Met. Obs.*), **On the drought in Fukuoka Prefecture, 1958.** *urnal of Agricultural Meteorology*, Tokyo, 15(3):110–114, Jan. **1960.** 2 figs., 2 tables, ref. Japanese; English summary p. 114. **DWB**—It is said that the drought in the summer of 58 over the western parts of Japan was, in its intensity, next to the 1939 major drought. the former case Fukuoka Prefecture was the most severely damaged part of the Kyushu strict affected by the drought. Although in previous drought investigations both precipita- on amounts and rainless periods were mainly discussed, evaporation as well as the precipita- on must be considered as the important factors of the drought. According to Thornthwaite's nception of potential evapotranspiration, the author investigates the drought in 1958 in ukuoka Prefecture. First, from the 10-day mean temperature and precipitation for the 34 ations, the distribution of soil moisture, water surplus and water deficit were established. ext, estimating daily soil moisture for Fukuoka from May–Sept., the author investigates e progress of the drought and compares it with that for 1939 and the normal. Then, on the jective criterion already suggested, the author determines the rainless periods and investi- tes them. *Subject Headings:* **1. Drought intensities 2. Fukuoka Prefecture, Japan.**—*uthor's abstract.*

12.7–414 **551.577.38:551.573:551.579.5**(52-15)

Kusakabe, M., **On the drought of 1958 in western Japan from the viewpoint of potential apotranspiration.** *Journal of Geophysical Research*, Tokyo, 11(11):939–946, **1959.** 14 figs., tables. In Japanese. **DWB, DLC**—In order to explain drought conditions and water in- fficiency the author, taking into consideration evapotranspiration, has calculated the inflow d outflow of water in the areas of Kyushu and Yamaguchi. First, drought in summer and ater insufficiency in winter were investigated, based on results obtained from monthly inflow d outflow of water in western Japan, and it was found that water insufficiency in the south d east of Kyushu was very evident in the early part of Dec. Drought was investigated by -day graphs (shown in figs.), which indicate the most severe conditions in northern Kyushu, ukuoka and Fukae. Lastly, the daily moisture of soil in Fukuoka and Hachiya was studied d the result was compared with that of 1939 (when the most severe drought occurred). *bject Headings:* **1. Drought analysis 2. Potential evapotranspiration 3. Soil moisture udies 4. Japan.**—*K.C.*

12.7–415 551.577.38:591.54:598.2(572)

Tarasov, M. P., **Zasukha i zhivotnye.** [Drought and animals.] *Priroda*, Moscow, No. 12:102–103, Dec. 1959. **DLC**—A description is presented of the life of wild animals and birds under drought conditions, which occurred in the summer of 1957 in the Mongolian Altai. The moisture deficiency was so large that the steppe was yellow during the entire warm period. At 2700–3000 m and higher on the mountains the vegetation cover appeared more alive. The drought was marked in the lower mountain zones and in the desert steppes. Antelopes, not finding sufficient green fodder and deprived of their water holes, which were occupied by cattle raisers, migrated to northern and southern areas and deep into the desert where they congregated around rarely occurring free water holes. Saiga which were found in past years in Shargon-Gobi were encountered only at the end of September. Among rodents the drought caused a sharp reduction in numbers. The mid-day sand eel, which is an inhabitant of deserts and does not appear above altitudes of 1600 m, was observed at the beginning of June. At an altitude of 2300 m jack-daws and rooks, which in ordinary years build nests along the northern slopes of the Taisler Range, did not build their nests at all there in the summer of 1957 since the surrounding steppes were bare during the entire summer and insects were absent. *Subject Headings:* **1. Drought and migrations 2. Arid zone effects on birds 3. Buryat-Mongolian A.S.S.R.**—*I.L.D.*

12.7–416 551.577.52:551.585:634.94(94)

†Herbert, D. A. (*Univ. Queensland, Brisbane*), **Tropical and sub-tropical rain forest in Australia.** *Australian Journal of Science*, Sydney, 22(7):283–290, Jan. 1960. 22 refs. **DLC**—A discussion of the tropical rain forest in discontinuous areas of varying size in coastal North Queensland. The structural pattern of the rain forest is described as well as the ecological significance in the rain forest structure of various epiphytes. In cooler altitudes or latitudes rain forest to sub-tropical rain forest abrupt changes in rain forest structure are caused by sudden differences in soil type, drainage, or salinity. Gradual changes in rain forest structure are caused by increasing length of the dry season. Rain forest can survive with four or five comparatively dry months, provided the annual rainfall is more than 60 inches. The changes which occur as the dry period extends gradually to 8 or 9 months are described. *Subject Headings:* **1. Tropical rain forests 2. Australia.**—*I.S.*

RAIN, SNOW AND HAIL (551.578)

See also: **Snow cover on drifting ice, Arctic** (Iakovlev), 12.7–30; **Met. situations in which aircraft were damaged by hail** (Harrower, Evans), 12.7–58; **Forest and avalanches** (Richter), 12.7–96; **Snow removal in mountain passes** (Stackhouse), 12.7–114; **Radar scatter by hail** (Atlas et al.), 12.7–248; **Average bearing and incidence of rainfall, Namulonge** (Rose), 12.7–298; **Horsham hailstorm of Sept. 5, 1958** (Ludlam, Macklin), 12.7–342; **"Loewe phenomenon," Adélie Land** (Valtat et al.), 12.7–343; **Severe storm, S.E. Eng.** (Ludlam, Macklin), 12.7–345; **Morphology of thunderstorms and hailstorms** (Newton), 12.7–389.

12.7–417 551.578:551.574.11

Itoo, K. (*Met. Res. Inst., Japan*), **On the nuclei of the ice crystals in the air.** *Papers in Meteorology and Geophysics*, Tokyo, 7(3):267–270, Oct. 1956. 4 figs., 4 refs. **DWB**—Under the official microscope at Hailar, Manchuria, small spots were seen in the center of some crystals in the air. These, in the light of recent investigations made on small crystal nuclei by means of electron microscope, are now claimed to be the nuclei of the ice crystals in the air. Photographic representations of ice crystals observed under the optical microscope are presented. The crystals whose nuclei are clearly recognized are reportedly much less in number than the crystal whose nuclei were not recognized, the ratio being 20 to 1. It is maintained that the nuclei of most crystals escaped recognition, not because the nuclei did not exist, but because they were too small to be observed through the optical microscope. *Subject Headings:* **1. Ice crystal nuclei 2. Nuclei in free air.**—*I.S.*

12.7–418 551.578.41:061.3

International Union of Geodesy and Geophysics. Association of Scientific Hydrology. **Classificazione internazionale della neve.** [International classification of snow.] *Comitato*

aciologico Italiano, Turin, Bollettino, Ser. 2, 7 (2), 1956, issued **1959.** p. 33–57. figs. Transl.
o Italian of the **Classification** prepared in 1952 by its International Commission on Snow and
e, and published Aug. **1954** as *National Research Council of Canada. Associate Committee on*
il and Snow Mechanics, Technical Memorandum, No. 31 (*see* 8.6–305, June 1957, *Met. Abs.*).
LC—*Subject Heading:* **1. Snow classification.**

HYDROMETEOROLOGY (551.579)

See: **Met. and hydrol. studies,** 12.7–3; **Hydrol. conditions Olaf Prudes Bay** (Kunetskiĭ), 12.7–36; **Effects of climate and grazing on mixed prairie** (Tomanek), 12.7–89, **Studies on dredged sands, Visakhapatnam** (Mahadevan, Anjaneyulu), 12.7–203; **Items** 12.7–220 to 12.7–223, 12.7–226 to 12.7–228; **Complex automation of hydromet. measurements** (Syĭko, Danilin), 12.7–299; **Radiation temp. effect on snowmelt** (Subbotin, Miliukova), 12.7–352; **Correlation of precip. and water level variations, Lake Balâta** (Borhidi, Komlódi), 12.7–407; **Rainfall and runoff, Tadami River Upper Basin** (Shimada et al.), 12.7–410; **Met. factors affecting dam design and construction** (Tucker), 12.7–412.

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY (551.58)

See also: **Applied climat.** (Anapol'skaia, Gandin), 12.7–38; **Elec. engineering climatology** (Rychtera), 12.7–108; **Climate in lower atmos. near mountains** (Kurihara), 12.7–324; **Radiative heat transfer and climat.** (King), 12.7–326.

12.7–419 551.58:574.9:551.433(661)

, †Kaiser, Ernst (*Hildburghausen*), **Die saharischen Hochgebirge: eine vergleichend bio-**
ographische Studie. [The high mountains of the Sahara: a comparative biogeographical
ıdy.] *Leipzig. Deutsches Institut für Landerkunde, Wissenschaftliche Veröffentlichungen,*
). 15/16:94–132, **1958.** 3 figs., 8 plates, 4 tables, 59 refs. **DLC**—Ahaggar and Tibesti are
e two mountain massifs in the heart of the eastern Sahara. A geological orographic, climato-
;ic and hydrographic outline precedes the description of biotic conditions of the former
;ion and is followed by a chapter on man in the landscape. A similar treatment of Tibesti,
th emphasis on peculiar features of this region such as its garden cultures, palm groves and
phur wells, is followed by the concluding chapter on world conservation. *Subject Headings:*
Biogeography of the Sahara 2. Ahaggar Mts., Algeria 3. Tibesti Mts., French Equatorial
rica.—*O.T.*

12.7–420 551.58(023)

Klado, T. N., **Klimat ego znachenie i metody izucheniia.** [Climate: its importance and
methods of study.] Leningrad, Gidrometeoizdat, **1949.** 86 p. 30 figs. (Biblioteka
drometnabliudatelia.) **DWB** (M8K63kL)—A popular scientific qualitative discussion of
e nature of climate and the manner of its investigation. The Soviet climatologists define
mate as the regular succession of meteorological processes, which is determined by a complex
physical geographic conditions and is manifested as the secular weather regime observed in a
en locality. The contents of this booklet illustrate by means of diagnosis photographs,
ps, and graphs and comprise the following: the meteorological elements determining weather,
h as solar radiation and the atmospheric circulation (general circulation, air masses and
nts) and the various properties of the earth's surface that influence climate, such as the
even distribution of water and land, snow and ice cover, mountains, mountain-valley winds,
n winds, "Cora" wind, direction of slopes (exposition), and vegetation, classification of
nate and the principle climatic zones including the characteristics of tropical, temperate and
ar climates and extreme values of the meteorological elements; the characteristics of micro
d local climates (mesoclimates) and the physical geographic factors determining them;
thods of investigating climate both in the U.S.S.R. and abroad; the effect of climate on
nts and man; climatic changes and the significance of climatology in the national economy.
bject Heading: **1. Climatology.**—*I.L.D.*

CLIMATIC ZONES (551.581)

12.7–421 551.581(213)

†Blumenstock, David I. (*Pacific Area climatologist, U. S. W. B., Pacific Supervisory Office, Honolulu*), **Distribution and characteristics of tropical climates.** *Pacific Science Congress, 9th, Bangkok, 1957, Proceedings*, Vol. 20, pub. **1958.** p. 3–24, 5 figs., 66 refs. **DWB** (M(06) P117p)—The major topics discussed are: the boundary between tropical and extra-tropical climates, the boundary between humid and arid tropical climates, circulation regions of this tropics, illumination and radiation, temperature and heat, and rainfall and moisture. The tropical climatic realm is best defined as the region within which the temperature of the coldest month averages at least 64.4°F; but the tropical realm also includes highland and mountain areas. Koppen's wet-dry boundary is a convenient one to use in defining the limits of the humid tropics. Five circulation regions with distinctive climatic properties are: the region of "middle latitude" westerlies, the trade wind region, the monsoon region, the doldrums, and the hurricane areas. The unique characteristics of the tropical climatic realm are its illumination and radiation regimes. The realm is unique also in that it includes the zone of minimum natural radiation from cosmic ray secondaries although there are marked variations in radiation background especially with elevation and these may be biologically significant because of their differing influence upon natural mutation rates. As for thermal conditions, of special interest are the cold waves and heat waves that occur in certain areas. More important is the rainfall variability which accounts for the fact that except at the heartlands of the humid tropics drought is a common phenomenon. Notions regarding the water economy of the humid tropics may need to be revised because of the quantitative significance in many areas of the addition of water to the ground by dewfall and from fog or cloud. *Subject Headings:* **1. Tropical climates 2. Humid tropical climates 3. Illumination regime of tropics 4. Radiation regime of tropics.**—*E.Z.S.*

12.7–422 551.581:551.524.32

Laroque, J. (*Météorologie Nationale, Paris*), **Caractères polaires de la variation annuelle de la température.** [Polar characteristics of the annual temperature variation.] *La Météorologie*, Paris, Ser. 4, No. 57:65–75, Jan./March **1960.** 12 figs., ref. French, English, Spanish and Russian summaries. **DWB**—The curve indicating the annual variations of the mean monthly temperature in the polar regions shows a wide amplitude of temperature variation during the winter months; shortness of spring and autumn and no important temperature variation; increasing amplitude of the annual variation with latitude. The author examined the diurnal extremes of temperature for ten Antarctic stations, one Subantarctic station and one Arctic station; he next compared the annual temperatures variation with solar radiation variations. For this purpose, he determined the annual variation of the coefficient K defined by the expression $K = s/S$ where S represents a part of the terrestrial surface and s the straight section of the cylinder. The comparison of these variables indicates that the polar characteristics of the annual variation of temperature are closely connected with the astronomic peculiarities of the polar regions. They concerned primarily with the minimum temperatures, the values of which are determined through a radiative process, the maximum temperatures being principally determined through an advective process. *Subject Headings:* **1. Annual temperatures variations 2. Latitude effects 3. Adélie Land, Antarctica.**—*A.V.*

CLIMATE OF PARTICULAR PLACES (551.582)

See also: **Temp. and wind frequency tables, Eurasia** (Rayner, *ed.*), **Australian environment,** 12.7–10; **Antarctic met.** (Alt), 12.7–33; **Prelim. investigations for agroclimat., German Democratic Republic** (Mäde), 12.7–79; **Climat. data** (Reidat), 12.7–107; **Climat. annual of Portuguese Overseas Territories,** 12.7–256; **Met. results, 1956, Hong Kong,** 12.7–266.

12.7–423 551.582.1(52):361.

Saito, Ren-ichi (*Japan Met. Agency, Tokyo*), **The climate of Japan and her meteorologica disasters.** International Geographical Union, **Proceedings of the Regional Conference, Japan**

57. Issued Tokyo, **1959.** p. 173–183. 11 figs., 3 tables, 13 refs. **DWB** (910.6 161pr)—ie general character of the climate of Japan and an aerological consideration of seasons. imatic provinces are delineated. The climatic characteristics are represented in climo- iphs. Typhoons, heavy rain, heavy thaw, extratropical cyclones, drought, frost etc. cause ious damage during various seasons. *Subject Headings:* **1. Climate of Japan 2. Meteoro- ;ical disasters 3. Japan.**—*E.Z.S.*

12.7–424 551.582.2(99)

*Gusev, A. M. and Rusin, N. P., **Meteorologicheskaia kharakteristika lednikovogo sklona stochnoĭ Antarktidy.** [Meteorological characteristics of the glacier slope of East Ant- tica.] *Sovetskaia Antarkticheskaia Ekspeditsiia,* 1955– [*Trudy*], Vol. 2, issued Leningrad, 59. p. 68–72. 11 tables. **DWB** (M82/99 K81pe)—Meteorological characteristics of the ıer region of East Antarctic were studied at the Pioneerskaya station. The observation ta were published in the *Akademia Nauk, SSSR, Doklady,* (Vol. 117, No. 1, 1957). In this icle the authors present detailed data without explanation, which was published earlier. e tables contain the data on maximum, minimum and average values for each month for nospheric pressure, air temperature, relative humidity, wind velocity, cloudiness, visibility d daily distribution during each month of various atmospheric phenomena (snow, snow rm, snow drifting storm, fog, polar light, etc.) *Subject Headings:* **1. Climatic data for East tarctica 2. East Antarctica.**—*N.P.S.*

12.7–425 551.582.2:629.13(569.4)

*Israel. Meteorological Service, **Aeronautical climatological summaries, Lod Airport 945–47; 1950–56).** Its (*Pub.*), *Ser. A, Meteorological Notes,* No. 18, **1959.** 98 p. mostly bles. **DWB, DLC**—This is the 1st edition of **Aeronautical climatological summaries** for Lod rport, the only international airport of Israel. First, some preliminary remarks are made out the main climatological features and the typical synoptic situations, and then the matological data is tabulated. Wherever necessary explanatory notes are inserted. The ographic situation of Lod Airport is shown in a map. The airport is situated in the central astal plain of Israel (altitude 32°00′N, longitude 34°54′E). The climate is of the Medi- ranean type, the major part of the annual precipitation falling in the cold period of the year. *bject Headings:* **1. Local synoptic studies 2. Climatological data 3. Climate of Lod Airport, ael 4. Lod Airport, Israel.**—*I.S.*

12.7–426 551.582.3:551.524.37(763)

U. S. Weather Bureau, **Louisiana: mean date last freeze (32°) in spring (data 1921–1950), de available by cooperative Extension Work in Agriculture and Home Economics, State of uisiana, Louisiana State University** . . . map (in color, fold.). **DWB** (M24.37 U587Las)—is nicely drawn color chart shows by means of isochrones the range in date of mean last ezing temperatures in spring from Jan. 10 at Burrwood (at extreme SE tip) to > March 26 the Arkansas border. Marine influences (of the Gulf and Lakes) are very pronounced. *bject Headings:* **1. Freezing weather charts 2. Spring frosts 3. Louisiana.**—*M.R.*

CLIMATIC CHANGES (551.583)

See also: **When does spring begin** (Dolgoshov), 12.7–94; **Paleomag. investigations, Ukraine** (Komarov), 12.7–185; **Chamonix glaciers** (Finsterwalder), 12.7–233; **Astron. methods in hist. climat.** (Link, Linková), 12.7–448.

12.7–427 551.583.2:22.09

Williams, S. D. (*Regional Met. Center, Madras*), **Certain meteorological phenomena men- ıed in the Bible.** *Weather,* London, 14(12):398–400, Dec. **1959.** 3 refs. **DWB**—A paper ablishing the scientific validity of meteorological phenomena referred to in the Bible. The od of Noah, the occurrence of 7 years of plenty and famine in Egypt, and the famous Red phenomenon, are all explicable in present day meteorological terms. Likewise, the Biblical erences to winds and their relationship with hot and cold weather, remarks about clouds and ns, are based on sound meteorological knowledge and do not contradict the present day science of weather. *Subject Headings:* **1. Meteorological phenomena in the Bible 2. Biblical references to meteorological phenomena.**—*I.S.*

12.7–428 551.**583.3**:551.311.2:581.16
Clark, J. Desmond, **Early man in Africa.** *Scientific American*, N. Y., 199(1):76–83, July **1958.** 5 figs. **DWB, DLC**—Recent excavations at Kalambo Falls, N. Rhodesia, discovered some of the earliest known tools used by man. The rich deposits of fossilized pollen found below the normal river level indicate that the hand-ax man experienced a cooler and wetter climate. The dry periods of the Pleistocene very likely survived in the highlands near the Lake Tanganyika. Decline of this early African culture and the rise of the European culture may be attributed to difference in climatic conditions. The African had plenty of rain, abundance of food and enjoyed an easy life whereas the Europeans suffered hardships in western Europe during the last ice age, which motivated them to adjust themselves to their climatic conditions in order to survive. *Subject Headings:* **1. Climatic influences on man 2. Climatic changes 3. Pollen analysis 4. Pleistocene climates 5. Climatic comparisons.** —*W.N.*

12.7–429 551.**583.3**:551.311:550.1(410)
Hempel, Ludwig, **Probleme der Oberflächenformung in Grossbritannien unter klimamorphologischer Fragestellung, I.** [Problem of surface formation in Great Britain considered from the climatic-morphological point of view, Pt. I.] *Petermanns Geographische Mitteilungen*, Gotha, 102(1):13–27, **1958.** Pt. 2, *Ibid.*, 102(2):81–89, **1958.** 20 figs., 76 refs. **DLC.** Review of Pt. 2 by E. M. Yates in *Geographical Journal*, London, 125(3/4):438–439, Sept./Dec **1959.**—The geological structure and topographical formation of the English and Scottish landscapes were studied with available literature and by field studies. The problem is interpreted in the light of super imposition of several formation cycles as dependent upon different climates throughout the various periods of times. Illustrations, maps, geological and geomorphological cross sections and profiles support the text. *Subject Headings:* **1. Geomorphology of Great Britain 2. Climatic variations 3. Climatic influences on topography 4. Great Britain.**—*W.N.*

12.7–430 551.**583.3**:551.311.
Johnsson, Gunnar (*Dept. of Geog., Univ. of Lund*), **Periglacial wind and frost erosion a Klågerup, S. W. Scania.** *Geografiska Annaler*, Stockholm, 40(3/4):232–243, **1958.** 13 figs. 21 refs. **DWB, DLC**—Discovery of windblown fine sand in the intersedimentary layers a Klågerup in relation to dating of its erosion and origin is discussed here and may give a understanding of climatic changes from a maritime to a more continental climate. This i discussed particularly as related to the advance of the Young Baltic glacier. Before advancing north the area was probably exposed to westerly winds. When the advance hampered th wind effect, the local factors contributed to change of climate. *Subject Headings:* **1. Climati variations 2. Periglacial climates 3. Frost erosion 4. Periglacial wind erosion 5. Klågerup Skåne, Sweden.**—*W.N.*

12.7–431 551.**583.3**:551.324.8(234.8
†Kaletskaia, M. S. and Miklukho-Maklaĭ, A. D., **Nekotorye cherty chetvertichnoĭ istor vostochnoĭ chasti Pechorskogo basseĭna i zapadnogo sklona Poliarnogo Urala.** [Some char acteristics of the Quaternary history of the eastern portion of the Pechora Basin and the wester slope of the Polar Urals.] *Akademiia Nauk SSSR. Institut Geografii, Trudy*, Vol. 76, 195 66 p. 14 figs. (incl. photos), table, bibliog. p. 64–66. **DLC**—The region in which the stud of the quaternary period was carried out is situated on the western slope of the Polar Ural between the valley of the Usa River (Sart-Iu) on the north and the sources of the Kech-Pe River on the south and the adjoining area of the eastern part of the Pechora Basin. Th Pechora Basin experienced repeated glaciations. Most pronounced are the traces of two shee glaciations, since in both epochs of glaciation the Urals were the principal source of detritio for the eastern part of the Pechora Basin. The moraine of the penultimate sheet glaciatio of the so-called lower moraine, is absent in the mountains and in the foothills region. Th interglacial period was characterized by complete disappearance of the ice sheet within th

in and intense erosional activity caused by young elevations. The ice sheet was destroyed
a considerable extent also in the mountains and foothills. At the same time interglacial
ıvial deposits accumulated to a thickness of 7–8 m in the depressions of the relief. The last
et glaciation was not very thick. The moraines of this glaciation are characterized by
ase instability and by variation in thickness from several centimeters to 20 m and more.
e paleographic characteristics of this glaciation is its passivity and extensive development
nert ice. The period of passive sheet glaciation is separated from that of mountain glacia-
h by a period of disappearance of ice. It is characterized by intense erosional processes
ised by renewed tectonic movements in the mountains and foothills of the Polar Urals.
is period is associated with considerable transformation of the hydrographic network; its
osits constitute the sands and lacustrine clays found at the mouth of the Niia-Iu River,
l in the upper reaches of the Pai-Pudyna and Usa Rivers. The mountain glaciation did not
end far from the limits of the mountains. Its principal centers of glaciation were the
untain junction in the upper reaches of the Bol'shaia Usa River and the massifs at the sources
the Kech-pelia, Kharoty and Sobi-Pai-Ep and Pai-Iz Rivers. A small independent center
laciation existed in the northeast part of the Engane-Pe massif. The moraines of mountain
ciation are characterized by large detritus material and a small amount of soil. The
ılders are large and in the southern center of glaciation they consist of peridotites. *Subject*
dings: **1. Quaternary period 2. Pechora Basin, U.S.S.R. 3. Ural Mts., U.S.S.R.**—*I.L.D.*

12.7–432 551.583.3:551.324.435
Lundqvist, Jan, **Geokronologiska undersökningar i Värmland.** [Geochronological re-
rches in Värmland, western Sweden.] *Sweden. Geologiska Undersökning,* [Publications],
. C, No. 551; Årsbok, 51(2), **1957.** 28 p. 6 figs., chart (fold. in pocket), 24 refs. English
ımary p. 24–27. **DLC**—The two main types of glacial clay in Värmland are described.
e occurrence of varves in most parts of Värmland is sporadic and with the weak exception of
se in Bjurtjärn were of negative value for geochronological purposes. Three different types
varves were observed in Bjurtjärn. None of the profiles were of good quality but four
ups are distinguishable. They could not be correlated with profiles published by DeGeer
40) or measured by Hörner. A diagram of the ice recession is given. The equicesses
w that the rate of recession has been about 160 m/year. Variations in varve thickness are
cussed. Difficulties in correlating varves of the Bjurtjärn type are explained. *Subject*
adings: **1. Geochronology 2. Varves 3. Glacial periods 4. Sweden.**—*E.Z.S.*

MICROCLIMATOLOGY (551.584)

See also: **Aeronaut. met. tables, Kuopio and Vaasa airports** (Venho), 12.7–60; **Weather in wheat** (Penman, Long), 12.7–82; **Nocturnal temp. in vineyards, Elbe Valley** (Fuss), 12.7–87; **Microclimat. investigation of waste heap** (Sakanoue), 12.7–97; **Rainfall variations over a small area** (Oliver), 12.7–296; **Temp. measurements in a frost hole, Tharandter Forest** (Junghans), 12.7–366.

12.7–433 551.584.61
Brown, G. L. (*Division of Plant Industry, C.S.I.R.O., Canberra*), **Control of temperature**
l day length in glasshouses. *Journal of Agricultural Engineering Research, Silsoe,* 5(4):433–
, **1960.** 3 figs. **DLC**—For certain experimental work relating to plant growth, it is
essary to control the air temperature and day length. This paper describes apparatus
igned for this purpose. A number of temperature controlled greenhouses are used together
h bench units which provide independent control of day length and night temperature, with
roved local regulation of day temperature. *Subject Headings:* **1. Artificial climates**
Temperature controlled greenhouses 3. Plant growth temperatures.—*R.B.*

12.7–434 551.584.61:551.586:61
Dedabrishvili, O. I., **Mikroklimat i mikroflora klassnykh komnat i aerogennye infektsii**
di uchashchikhsia v shkolakh Tbilisi. [The microclimate and microflora in classrooms and
airborne infections among the school children of Tiflis.] *Gigiena i Sanitariia,* Moscow,
2):40–46, Feb. **1959.** 3 tables, 11 refs. English summary p. 46. **DLC**—The author has

studied the sanitary conditions of several schools in Tiflis, the changes of the morbidity rat among the school children and the number of days missed during the different seasons of th year. It has been discovered that the school children suffered mostly from airborne infections The incidence of these infections was directly connected with the hygienic conditions of th school and especially with the intensity of bacteriological contamination of the air. The dat obtained show that in addition to the routine sanitary measures, the purification of air in th classrooms had a direct effect on the fall of the incidence of airborne infections among schoo children. *Subject Headings:* **1. Schoolroom microclimates 2. Biometeorology 3. Air-born diseases 4. Tiflis, Georgian S.S.R.**—*Author's abstract.*

12.7–435 551.584.61 551.524:694.5:691.3

Moore, Bernard H. (*Meteorologist*), **Notes on temperatures under plastic roof and in sla house.** *Federal-State Warning Service, Lakeland, Fla., Weather Forecasting Mimeo* 59-6, Apri 17, **1959.** 1 p. table. **DWB**—The report of an experiment to investigate the rise in temperature under plastic roof and in slat house. Two stations, one with the conventional sla roof providing 50% cover and the other with roof of plastic film affording 90% cover, wer established on Dec. 20, 1958 and were operated during the remainder of the winter season a Blaser Nursery near Tallevast. Each was equipped with Weather Bureau type thermograp and minimum thermometer. Temperatures thus obtained are compared with those at th nearby Tallevast forecast station, representative of the area. All the three temperatures fo the 25 "cold nights" are tabulated. The average temperature under the plastic roof wa found to be 2.4° higher than outside, and that of slat cover 1.6° higher. Results were mor favorable on nights with little or no wind. *Subject Headings:* **1. Indoor climates 2. Temperature comparisons 3. Tallevast, Fla.**—*I.S.*

12.7–436 551.584.61:63

Whittle, R. M. and Lawrence, W. J. C. (*both, John Innes Institute, Bayfordbury, Hertford* **The climatology of glasshouses, Pt. 5, The heat consumption of glasshouses.** *Journal c Agricultural Engineering Research*, Silsoe, 5(4):399–405, **1960.** fig., 3 tables, 5 refs. **DLC**– Investigations were made on the heat consumption of several glasshouses, and on the effec of wind velocity. The overall heat transfer coefficient was approximately 1 $B.t.u.ft^{-2}\,hr^{-1}\,{}^{\circ}F$ at zero wind and a wind velocity of about 15 m.p.h. doubled heat consumption. Studies wer also made on the influence of blinds, double glazing, heater design and heating pipe positio and number. *Subject Headings:* **1. Glasshouse climates 2. Heat transfer in glasshouses.**– *Author's abstract.*

CLIMATIC CLASSIFICATION (551.585)

See also: **Humid tropics res.** (UNESCO), 12.7–2; **Antarctic met.** (Alt), 12.7–33; **Tropical rain forest, Australia** (Herbert), 12.7–416.

12.7–437 551.58

Lange, Gottfried (*Marburg*), **Über klimatologische Zonenbestimmung nach terrestrische Anhaltswerten.** [Climatological zonation according to terrestrial continuities.] *Meteoro logische Rundschau*, Berlin, 12(5):152–153, Sept./Oct. **1959.** 8 refs. **DWB, DLC**—A revie and commentary on the development of classification systems. A meaningful classificatio must take global basic facts into consideration, such as the complexities of the air masses an their behavior during the year. As a starting limiting value, certain local temperature medi of the extreme months may be chosen. The freezing limit as a temperature maximum autochthonous polar masses, the summer day's limit (25°) as a minimum of correspondin tropical masses and the earthly total value (15°C) separate basically and, especially in wint Pacific from temperate cyclonic masses. *Subject Headings:* **1. Climatic classification system 2. Climatic zonation.**—*E.Z.S.*

12.7–438 551.585.5 551.588

Ivanov, N. N., **Poiasa kontinental'nosti zemnogo shara.** [Belts of continentality on th globe.] *Vsesoiuznoe Geograficheskoe Obschestvo, Leningrad, Izvestiia*, 91(5):410–423, Sept

. **1959.** 6 tables, 4 refs., 2 eqs., map (fold). **DLC**—After a critical review of Khromov's nula for determining continentality and of his own previous formula for continentality, author presents a new method for determining degree of continentality of land and water as. It includes the concept of "planetary zero" which represents the boundary between l and ocean influences so chosen that the initial "zero" is a positive number sufficiently e so that the continentality of the climate of the most oceanic regions of the earth is not than zero. The formula for continentality of climate is based on these climatic elements: he annual amplitude of atmospheric temperature 2) the diurnal (aperiodic) amplitude of ospheric temperature expressed mean annually and 3) atmospheric relative humidity ciency (mean daily) for the driest month. A formula for continentality, taking into account comparison of the actual sums of the three components with their planetary sum from ch the effect of latitude and of non-uniform distribution of land and ocean has been exled, is developed. This formula is

$$K=\frac{A_a+A_d+0.25\,D_0}{0.35\varphi+14}\times 100$$

re A_a=annual temperature amplitude, A_d=daily temperature amplitude, D=relative nidity deficit. By means of this formula the author calculated 10 zones of continentality, ch are presented on a map. Also the indices of continentality calculated with the author's nula and with the formulas of GORCZNSKI, ZENKER and KHROMOV, and the author's earlier nulas are presented in a table and the values are compared. *Subject Headings:* **1. Conntal climates 2. Climatic zones 3. Global climatic zonality.**—*I.L.D.*

12.7–439 551.585.55(791)

Arizona. Univ., **Interdisciplinary study of the utilization of arid lands; first annual report.** ed **June 1, 1959.** 26 p. map, diagram. **DWB** (85.53 A719ut)—A report on the disinary study of the fundamental biological and physical mechanisms at work in arid regions. s report on the utilization of arid lands is part of the "Arid Land Project." It summarizes work done (in Arizona), in progress, and plans for further research. Progress reports on aeology, biology, climate, geochronology and geohydrology are included. Basic climatic on Arizona have been collected and will be published shortly. *Subject Headings:* **1. Arid l utilization 2. Arid Lands Project 3. Arizona.**—*E.Z.S.*

BIOCLIMATOLOGY (551.586)

See also: **Plants and radiation** (Sauberer, Härtel), 12.7–12; **Weathercraft** (Smith), 12.7–20; **Bioclimat. in health resort and spa management** (Undt), 12.7–41; **Prelim. investigations for agroclimat., German Democratic Republic** (Mäde), 12.7–79; **Agromet. and agric. production** (Calzada Benza), 12.7–81; **Weather in wheat** (Penman, Long), 12.7–82; **Arctic front effects on climate and crops, Iceland** (Malmström), 12.7–83; **Effect of met. conditions on rice plants** (Shiraki et al.), 12.7–84; **Weather and hay yield, Eng.** (Smith), 12.7–85; **Climate and weather effects on viticulture, The Palatinate** (May), 12.7–86; **Applying weather data to crop drying** (Hedlin), 12.7–88; **Effects on climate and grazing on mixed prairie** (Tomanek), 12.7–89; **Agromet. and plant diseases** (Bazán de Segura), 12.7–90; **Agromet. and agric. plagues** (Beingolea), 12.7–91; **Plant-water relations** (Kramer, Russell), 12.7–93; **WMO. Comm. for Agric. Met., Warsaw** (Hrbek), 12.7–95; **Met. factors controlling scrub burns, Queensland** (Whittingham), 12.7–98; **Climatic effects on Oribatidae fauna, Erzgebirge** (Markel), 12.7–99; **Photoperiod and cold-storage treatment in spruce budworm** (Harvey), 12.7–100; **Biol. effects of atomic radiation**, 12.7–103; **Traffic accidents and weather conditions** (Sato), 12.7–113; **Heat economy of plants** (Pfeifer), 12.7–260; **Calculation of frigorigraph temps. from met. measurements** (King), 12.7–302; **Microclimate and micro-organisms in classrooms, Tiflis** (Dedabrishvili), 12.7–434.

12.7–440 551.586:574

Kérdo, I. (*Staatliches Inst. f. Rheuma u. Bäderwesen, Budapest*), **Komplexe Betrachtungse bei der Beurteilung von biologischen Wirkungen klimatischer Umweltfaktoren.** [Biological effects of climatic environmental factors considered from several viewpoints.] *Zei* *schrift für Meteorologie*, Berlin, 13(1/6):80–82, Jan./June 1959. 5 refs. German and Englis summaries p. 80. **DWB, DLC**—Although the influence of climate on physiological functio is well known since thousands of years, the knowledge about the nature of these connectio had been rather poor. Physics of the atmosphere and biology having made remarkab progress indeed, our knowledge should now be revised in the light of the modern standard science. Above all, the conception of the climate has changed. While earlier climate ha been referred to as a static state, i.e., the integration of average values of various elements the atmosphere near to the earth, climate is today regarded as an integration of dynamic processes. In other words, climate includes the sequences of periodical cycles of energet states, originating from the interrelationship between a) solar and space energy, and b) physic and chemical properties of the atmosphere and the surface of the earth. From this point view, the biological parameters of climatic health resorts should be reconsidered. Apart fro the classical climatic data the cyclic course of the several elements and the orographic conditio have to be taken into consideration. Integrating measuring techniques should be applie when determining thermal factors. As to biological effects there have also developed ne points of view. Meteorological and climatic environmental parameters affect the organis in so far as they are capable of influencing physiological processes, which may occur in vario ways. First of all, an adaptation decisively controlled by the vegetative system of nerves induced by environmental changes. Biological effects are, in addition, a function of th constitution, the momentary respective sensitivity, and psychic condition of the person question. *Subject Headings:* **1. Bioclimatology 2. Environmental physiology.**—*Author abstract.*

12.7–441 551.586:615.834 551.586:614

Noack, Rolf (*Forschungsinst. f. Bioklimatologie, Berlin/Buch*), **Die lufthygienische Situati in einigen Kurorten und Erholungszentren der DDR sowie Hinweise für Neuanlagen v Kurzentren.** [Atmospheric hygienic conditions in some health resorts and recreation cente in the German Democratic Republic; suggestions for the establishment of new health resorts *Zeitschrift für Meteorologie*, Berlin, 13(1/6):63–66, Jan./June **1959.** 2 figs., 8 refs. Germ and English summaries p. 63. **DWB, DLC**—Apart from a consideration of the integration thermal and photoacticic factors, the analysis of atmospheric hygienic conditions of a heal resort or recreational center is indispensable. Measurements of the number of fine du particles in Heringsdorf, Heiligendamm, Bad Liebenstein, and Wernigerode reveal the diff ences, which are regional and effected by wind, between health resorts situated in coastal are (Baltic Sea) and mountain sites (Mittelgebirge) respectively. Wernigerode, a favoura place in the sense of this study, and Bad Liebenstein, an unfavorable resort, represent t situation in Mittelgebirge. A comparison of these is made with the corresponding data Berlin-Buch (a favorable place at the city's outskirts) and Karl-Marx-Stadt (an unfavora industrial town). Finally, the necessity is underlined to include into the considerations projecting and establishing recreational centres, apart from wind pattern and orographi structure, the atmospheric stability. *Subject Headings:* **1. Atmospheric pollution and hea 2. Health resorts 3. Human climatology.**—*Author's abstract.*

12.7–442 551.586:615.8

von Philipsborn, E. (*Facharzt f. innere Krankheiten, Oberstdorf/Allgäu*), **Indikationen eine Klimakur im Gebirge.** [Indications for a climatic cure in the mountains.] *Zeitsch für Meteorologie*, Berlin, 13(1/6):104–106, Jan./June **1959.** 2 refs. German and Engl summaries p. 104. **DWB, DLC**—This paper gives a description of the differences betw maritime and mountain climates. It follows that the mountain climate has particular quali to which a healthy man reacts in a way different to that of a sick man. Hence, the indicati for a climatic cure in the mountains depend rather on the way a man reacts than on the k of the disease. Sensible, slim persons having hyperfunctioning thyroid glands are m suitable for a climatic cure in the mountains than the fat and slow types with a hypofunct of thyroid glands, the latter group of persons being in need for the more intense stimulations maritime climate (great cooling power, abundance of iodine of the air, wind effects et *Subject Headings:* **1. Mountain resorts 2. Climatotherapy.**—*Author's abstract.*

12.7–443 551.586:616

Lippert, Eugen (*Vienna*), **Zur Theorie der Meteorotropie.** [Theory of meteorotropy.] *itschrift für Meteorologie*, Berlin, 13(1/6):21–24, Jan./June **1959.** 36 refs. German and nglish summaries p. 21. **DWB, DLC**—Starting from the theory of meteorotropy, the complex important bioclimatological questions is touched. Meteorotropy being a vegetative reaction ould be regarded as a hypothesis. Principally, meteorotropic reaction is an essential physiogical criterion, namely, of the sensitiveness or capability of reaction. Accordingly, its nature marked by cellular reaction to be traced as a potential shift even in the biochemical structure the cells and in the constitution of protein molecules. *Subject Headings:* **1. Bioclimatology Weather sensitivity.**—*Author's abstract.*

ENVIRONMENTAL INFLUENCES (551.588)

See: **Natural coastal environments** (Putnam et al.), 12.7–19; **Forest and avalanches** (Richter), 12.7–96; **Geochem. and landscape** (Perel'man), 12.7–194; **Influence of radiation temp. on snowmelt** (Subbotin, Miliukova), 12.7–352; **Total and absorbed radiation, Terskei Ala Tau Range** (Danilova), 12.7–355; **Katabatic influence on ground wind variations, Adélie Land** (Gilbert), 12.7–385; **Local characteristics of surface winds in a small valley** (Yoshino), 12.7–386; **Belts of continentality** (Ivanov), 12.7–438.

SYNOPTIC CLIMATOLOGY (551.589)

See also: **Met. of tropical Pacific and Southeast Asia** (Ramage, *ed.*), 12.7–9.

12.7–444 551.589.5:551.553.5:551.591

Longley, Richmond W., **Winds and visibility at Resolute, Northwest Territories.** *Canada. eteorological Branch, CIR*-3039; TEC-269, April 23, **1958.** 5 p. fig., 3 tables, ref. **DWB, .C**—Describes a study about winds and visibility in the Northwest Territories of Canada. e period covered is Oct. 1 to May 31. Due to the snow in winter, visibility decreases. For vind speed of 10 m.p.h. about 10–20% of the observations report reduction in visibility and a speed of 20–24 m.p.h. the reduction is 50%. For wind speeds of 25–29 m.p.h. visibility 2 miles and for 30–34 m.p.h. it is 3/4 miles. No clear cut relationship has been established tween wind speed, direction and visibility. *Subject Headings:* **1. Wind speed data 2. Visiity data 3. Resolute, Northwest Territories, Canada.**—*A.H.K.*

12.7–445 551.589.6 551.501.5:551.508.26/.43

Linés Escardó, Alberto, **Singularidades en el curso anual de los fenómenos atmosféricos España.** [Singularities in annual variations of atmospheric phenomena in Spain.] *Revista Geofísica*, Madrid, 18(69):29–33, Jan./March **1959.** fig. (fold.). Spanish and English nmaries p. 29. **DWB**—The study of the weather characteristics throughout the year is iewed in this work. The author explains singularities and presents a brief discussion on rograms and thermograms. *Subject Headings:* **1. Singularities 2. Barograms 3. Thermoms 4. Spain.**—*E.Z.S.*

MISCELLANEOUS

COSMIC INFLUENCES (551.590)

See also: **Ninth Report for the Study of Solar and Terrestrial Relationships**, 12.7–130, **Ion pair production during solar eclipse, April 19, 1958** (Kawano), 12.7–140; **Freezing nuclei anomalies** (Kline, Brier), 12.7–399.

12.7–446 551.590.21

Berlage, H. P. (*Utrecht Univ.*), **Is the Southern Oscillation in meteorology becoming the ssical example of a terrestrial cycle steered by the solar cycle?** *Nederlandsch Geologisch jnbouwkundig Genootschap, The Hague, Verhandelingen: Geologische Ser.*, 18:13–21, May **7.** table, 5 refs. **CU, DGS**—The author analyzes the significance of Southern Oscillation

with regard to the solar-terrestrial relationship in meteorology; and summarizes the result
obtained in the Darwin region of Bombay, where sunspot and pressure intensities had been
observed. *Subject Headings:* **1. Solar-weather relationships 2. Southern oscillation.**—*N.N.*

12.7–447 550.385.4:550.342:551.590.2

Bernard, Pierre, **Sur le bilan mécanique de l'influence solaire sur les phénomènes terrestres.** [Mechanical balance of solar influence on terrestrial phenomena.] *Académie de*
Sciences, Paris, Comptes Rendus, 250(15):2738–2739, April 11, **1960.** 6 refs. **DWB, DLC**—
The variations of geomagnetic disturbances and the microseismic agitation show an undecennia
variation, based on solar activity with a maximum during its decreasing phase. Likewise
recent measurements relating to the earth's rotation indicate a maximum of the day's duratio
appreciably posterior to that of solar activity. One might consider between the variation
of geomagnetic disturbances and agitation on the one hand and the period of earth's rotatio
on the other, a simple mechanical connection. According to the author, the influence of the
exosphere would be mechanically insufficient to account for the variations of the earth'
rotation with solar activity. The influence of certain meteorological situations (strong winds
would not be negligible in this field. *Subject Headings:* **1. Geomagnetic disturbances 2. Sola**
activity-geomagnetic disturbances relationships 3. Solar activity-microseisms intensit
relationships.—*A.V.*

12.7–448 551.590.21:551.576.2 523:551.576.2:551.583.

†Link, František and Linková, Zděnka (*both, Inst. Astronomique de l'Acad. Tchecosl. des Scien*
ces, Prague), **Méthodes astronomiques dans la climatologie historique (Période solaire et climatique de 400 ans).** [Astronomical methods in historical climatology (solar and climatic period
of 400 years).] *Studia Geophysica et Geodaetica,* Prague, 3(1):43–61, **1959.** 5 figs. ,5 tables, 3
refs. Russian summary p. 61. **DWB**—Since the execution of astronomic observations de
pends upon meteorological conditions such as cloudiness at the moment of observation, th
frequencies of astronomic observations in annals of past records can provide data on cloudines
in the historic past. The circumstances associated with astronomical observations in
historical document involve the following factors, viz.: cosmic—the frequency of observation
is a function of the cosmic frequency of a phenomenon; climatic—frequency depends on fre
quency of days favorable for observations; and social phenomenon is considered significant a
the time of observations. The phenomena considered are comets, solar and lunar eclipse
meteors and polar auroras. The contents of this paper comprise the following, viz.: an analysi
of the various factors, historical sources of observations on comets, eclipses and meteors an
auroras; the method of reduction of observations which expresses the relation of these factor
by a mathematical formula; secular variations of night cloudiness; and secular variations
polar auroras. The variation of night cloudiness, determined from observations on comet
extending over 400 years, has been determined and found to correspond to the climatic varia
tions established by C. E. P. Brooks. The form of the last 5 maxima of cloudiness since th
start of the present era has been determined. The observations on eclipses likewise show
period of 400 years. However, the relative phase of the curves excludes the possibility
climatic influence upon annual variation, which is primary and the expression of the variab
solar activity during the 400 year period. The 400 year variation of the solar activity in
fluences climate in the sense that increase in solar activity raises the cloudiness and vice versa
Subject Headings: **1. Climatic influences 2. Astronomic observations-cloudiness relationship**
3. Historical periods 4. Cloudiness influences.—*I.L.D.*

12.7–449 551.590.21:551.555.6:551.524.3

Verdier, Jean, **Chem vyzvano pokholodanie v Evrope?** [What caused the cold wave
Europe?] *V Zashchitu Mira,* Moscow, 5(50):99–103, Aug. **1956.** photos. **DLC** (Slavic)-
A number of theories regarding the mechanism by which the intense solar activity (such
was observed in Feb. 1956) could be manifested by unusual weather (such as the cold wave
Europe in Spring 1956) are critically reviewed for popular information. Increase in cosm
rays could be one of the causes or could be merely a parallel phenomenon to the linking mec
anism–both arising from the solar disturbance. Views of American-French Scandinavia
and other astrophysicists are mentioned. Pictures of snow and ice conditions in cities

rope are included. *Subject Headings:* **1. Solar-weather relationships 2. Cold wave, Europe ring 1956) 3. Europe.**—*M.R.*

VISIBILITY (551.591)

See: **Visibility of artificial satellites** (Przybylski), 12.7–71; **Winds and visibility, Northwest Territories** (Longley), 12.7–444.

OPTICAL PHENOMENA (551.593)

See also: **Polarization technique for seeing through fogs** (Nathan), 12.7–360; **Measuring altitude of clouds by their crepuscular illumination intensity** (Dessens), 12.7–405.

12.7–450 551.593.51

Rackham, T., **Observations of the Green Flash at the Pic-du-Midi.** *British Astronomical sociation London, Journal*, 70(8):361–362, Oct. 1960. **DLC**—The author spent ten weeks Pic-du-Midi during 1959 and describes his experiences in observing green flashes both at rise and sunset. His attempts to photograph the phenomena were not very successful. *bject Headings:* **1. Green flash 2. Pic du Midi, France.**—*R.B.*

12.7–451 551.593.62:551.508.93

Ananthakrishnan, R. and Venkiteshwaran, S. P. (*both, Met. Office, Poona*), **Formation of nbows in a vertically projected search-light beam.** *Indian Journal of Meteorology and Geo- ysics*, New Delhi, 10(4):456–459, Oct. 1959. 2 figs. **DWB, DLC**—On the nights when nt or moderate rain was falling, observations of the searchlight beam of a ceilometer under t at Poona have revealed an interesting case of rainbow for motion. Watching the beam m a distance of about 100 yds one sees two bright bands revealing spectral colors. Photo- phs of these bands included in the paper show the upper band brighter than the lower one h a comparatively dark space between them. The angles of elevation of the two bands re calculated and were found to be in agreement with the corresponding angles of deviation the primary and the secondary bow of a rainbow. *Subject Headings:* **1. Rainbow formation Poona, India.**—*I.S.*

12.7–452 551.593.63

Findlater, J., **An unusual halo display and [Comment by] Editor.** *Meteorological Maga- e*, London, 89(1050):26–27, Jan. 1960. fig., 6 refs. **DWB, DLC**—An unusual display of o phenomenon, seen from Lasham, Hampshire on the morning of May 5, 1959, is briefly orted. The halo, bright but faintly colored was of 22° radius. A brilliantly colored upper gent arc to this halo appeared soon afterwards. A sketch of the halo showing spectrally ored arcs is included. *Subject Headings:* **1. Halo phenomena 2. Lasham, Eng.**—*I.S.*

ELECTRICAL PHENOMENA (551.594)

See also: **IGY data on whistlers, etc.**, 12.7–28; **Effect of earth's magnetic field on m.u.f. calculations** (Davies), 12.7–115; **VLF attenuation for daytime propagation using sferics** (Taylor), 12.7–117; **Performance of an RF impedance probe** (Jackson and Kane), 12.7–118; **Vertical incidence scatter** (Bowles), 12.7–121; **Ion pair production during solar eclipse, April 19, 1958** (Kawano), 12.7–140; **Audio-frequency electromagnetic noise** (Watts), 12.7–142; **Height and ionization density changes** (Martyn), 12.7–148; **Electron density profiles**, 12.7–150; **Ionospheric particle interaction**, 12.7–153; **Study of observed spread F** (Renau) 12.7–154; **Theory of slow-tail portion of atmos. waveforms** (Wait), 12.7–155; **Argus Experiment** (Christofilos), 12.7–170; **Ring-current effect** (Hines, Parker), 12.7–175; **Thunderstorms of Sept. 5, 1958, England** (Ludlam et al), 12.7–342.

12.7–453 551.594.1:551.510.522:551.509.3

Rott, G. and Tollner, H., **Besitzen Registrierungen des luftelektrischen Feldes nahe der loberfläche einen theoretischen und praktischen Wert?** [Do records of the atmospheric electric field near the earth's surface have a theoretical or practical value?] *Wetter und Leben* Vienna, 11(2/4):42–50, **1959.** 3 figs., table, 11 refs. **DLC**—On the basis of recordings of th atmospheric electricity field intensity carried out between 1952 and 1955 in the upper Kapru Valley (2040 m) in the Salzach Valley at Taxenbach Edt (800 m) and in the Salzach Valley a Högmoos (740 m), the authors attempt to answer the questions whether it is possible to mak weather forecasts from atmospheric electricity recordings and whether these provide a warnin of intense disturbances of potential gradient which lead to grave consequences in mountai regions. Of 41 days on which föhns aloft prevailed in the High Taurue the atmospheri electricity at Högmoos remained quite close to zero on 14 days, varied up to more than 40 volts/m in the positive on 20 days and showed moderate negative gradients (up to man tha 300 volts/m) on 4 days. The fact that on all 41 days föhn was recorded in the higher atmospheric layer before atmospheric disturbances were noticeable at Högmoos indicates that föh disturbances cannot be predicted from the variation of atmospheric electricity records in th valley. Variations in field intensity in the form of rapid positive and negative disturbance preceded thunderstorms and showers. Since such changes recurred without the subsequen thunderstorms and rainfall, it is concluded that either of these can take place, but not necessarily after such variations in electricity; usually deviations from the normal atmospheri electricity field or disturbances similar to those from a thunderstorm precede rainfall of lon duration. The possibility of utilizing atmospheric electricity for forecasting purposes and th practical significance of atmospheric electricity recordings are discussed. *Subject Headings* **1. Atmospheric electricity 2. Föhn disturbances 3. Weather forecasting.**—*I.L.D.*

12.7–454 551.594.22:551.57

Takeuti, T.; Ishikawa, H. and Takagi, M., **On the cloud discharge preceding the firs ground stroke.** *Nagoya Univ. Research Institute of Atmospherics, Proceedings,* 7:1–6, Jan **1960.** 8 figs., 7 refs. **DWB** (M(05) N152p)—As to the beginning stage of a ground discharge the following facts have been obtained by a field meter with the aid of a radio receiver and flash intensity recorder. About 50% of the ground discharges are preceded by a "pre-preliminary discharge" which occurs within 500 ms before the first ground stroke, so the discharg precedes also "the preliminary discharge" which is named by CLARENCE and MALAN "th B I L change" (1). The term "B I L" is used in this paper to avoid confusion of the preliminary with the pre-preliminary. In some thunderclouds the greater part of the first groun stroke is preceded by the pre-preliminary discharge; however, in others, the strokes are precede only by the "B I L" discharge. On the average the ground discharge preceded by the pre preliminary discharge have fewer ground strokes than those preceded only by the "B I L discharge; so, the pre-preliminary discharge must neutralize the negative charge concernin the ground stroke. The relation between the pre-preliminary discharge and the "B I L discharge is not obvious at the stage. *Subject Headings:* **1. Electrical discharges 2. Thunderclouds.**—*Authors' abstract.*

12.7–455 551.594.221:778.3

Brook, M. (*New Mexico Inst. of Mining and Technology, Socorro, N. M.*) and Vonnegut, B (*Arthur D. Little, Inc., Camb., Mass.*), **Visual confirmation of the junction process in lightnin discharges.** *Journal of Geophysical Research,* Wash., D. C., 65(4):1302–1303, April **196** 9 refs. **DLC**—Favorable visibility made it possible to observe both horizontally progressin junction streamers and vertical streamers. The intermittent dartlike manner in which th junction streamer progressed is excellent evidence that the slow junction field change, actually the sum of the individual *K* changes observed on field meters of high time resolutio Photomultiplier studies of nocturnal lightning also associate luminosity with the *K* change *Subject Headings:* **1. Lightning discharges 2. Lightning photography 3. Lightning structur** —*E.Z.S.*

12.7–456 551.594.253:551.576:536.42

Kuettner, J. and Lavoie, R. (*both, Mt. Washington Obs.*), **Studies of charge generatio during riming in natural super-cooled clouds.** *Conference on Atmospheric Electricity, 2n Portsmouth, N. H., May* 1958, *Proceedings,* issued **1958.** p. 391–397. 5 figs., table, 7 ref **DWB** (M(055) C748pr)—Charge generation of thunderstorm electricity has been studied i oratories and in the field. Its generation by solid precipitation presents quite a problem cause of poor instrumentations. The present report describes with photographs the results tained with the Keithley-electrometer designed to measure the electric characteristics of the cretion process in natural supercooled clouds. The Office of Naval Research has made the oduction of this instrument possible and the Mount Washington Observatory has conducted er 100 test runs with it; the results therefrom are contained in this report. They reveal that nclusions reached hitherto based on the few in-cloud measurements in other literature were emature. *Subject Headings:* **1. Thunderstorm electricity 2. Rime formation 3. Super-oled clouds.**—*N.N.*

ACOUSTICAL PHENOMENA (551.596)

12.7–457 551.596.1:551.551.5

Batchelor, G. K. (*Cavendish Lab., Univ. Cambridge*), **Wave scattering due to turbulence.** *itional Research Council, Wash., D. C., Publication* No. 515:409–430, **1957.** fig., 7 refs., 64 s. **DLC** (QA927.U5 1956)—When a sound wave is incident upon a part of the medium ich contains small irregularities scattered waves are set up. The irregularities, which may either variations of velocity or of physical properties such as temperature, are here assumed be random as a result of the action of turbulence in the medium. The basic equations that scribe the propagation of sound in both air and water containing various kinds of non-iformity are derived. After a general exposition of the theory of scattering in continuous edia, the scattering cross-section for each of these cases is obtained, and is found to depend the spectrum of the spatial distribution of the relevant property of the medium. *Subject eadings:* **1. Sound wave scattering 2. Turbulence effects on sound waves.**—*Author's stract.*

12.7–458 534:551.596.1

†Ivanovskiĭ, Andreĭ Ivanovich, **Teoreticheskoe i eksperimental'noe izuchenie potokov, zvannykh zvukom.** [Theoretical and experimental investigation of flow produced by sound.] oscow, Gidrometeoizdat, **1959.** 114 p. 19 figs., tables, 71 refs., eqs. At head of t.-p.: entral' naia Aerologicheskaia Observatoriia. **DWB** (M96.1 I93te)—The monograph is dicated to the study of fluid flows produced by spreading sound waves. The author develops e theory of these flows which are connected with the non-linearity of equations of hydro-namics and presents the results of an experimental verification of the equations that were rived. The three chapters of the monograph deal consecutively with: 1. theoretical study acoustic waves; 2. theory of the method of measuring the coefficient of sound absorption m the phenomenon of acoustic wind, and 3. description of the experimental outfit and a scussion of results. *Subject Headings:* **1. Sound waves 2. Acoustical propagation.**—*A.M.P.*

PART II. ANNOTATED BIBLIOGRAPHY ON PRECIPITATION CHEMISTRY

By: Malcolm Rigby and Evelyn Z. Sinha

INTRODUCTION

Research on the chemistry of precipitation received its earliest impetus from the advances made in agricultural chemistry between 1750 and 1850. Although the earliest investigations were mainly concerned with nitrogen compounds in atmospheric precipitation, most of the inorganic compounds present were known by 1850. Since 1850 interest in the nitrogenous compounds continued along with increasing interest in all the constituents of precipitation. With the advance of the science of meteorology, research on the chemistry of precipitation was shared by meteorologists.

This bibliography contains abstracts of reports of investigations made since 1822 by agricultural, meteorological and forestry researchers as well as those made during studies of atmospheric pollution. An attempt has been made to find and incorporate as many studies as possible made throughout the world which might reflect significant spatial differences or similarities.

The compilation has been arranged in chronological order to show the trend of thought concerning the origin or source of the individual constituents and the consideration of their relationship to meteorological and other factors.

A detailed guide to aspects of specific interest is provided by the subject and geographical outlines.

References to works on artificial radioactivity in atmospheric precipitation were deliberately excluded.

In preparing this bibliography considerable use was made of the "Annotated Bibliography on Precipitation Chemistry" prepared by John R. Mather (see item 12G–288). This bibliography of 147 items was, in turn, based on a compilation of nearly 100 abstracts and references furnished to Dr. C. W. Thornthwaite in 1959 by Meteorological Abstracts.

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  - Hawaii, 12G–174, –207, –211, –234, –235 –240

1825

12G–1 551.577.13:551.464

Saline impregnation of rain. *Edinburgh Journal of Science*, Edinburgh, 2:176, **1825.** "Not based on *Manchester Memoirs*, n.s., Vol. 4:330–370." **DLC** (Q1.E2)—"After a severe storm o Dec. 5, 1822, DALTON examined the rain that fell at Manchester, and found that it contained 1 grai of salt, muriate of soda, in 10,000 grains of water; and as sea water contains 1 grain of salt in 25 o water, there must have been 1 grain of sea water in every 400 grains of rain water. This storm wa from the S.W. to the W. The S.W. wind comes from the coast of Wales, distant 100 mi, and th W wind from off Liverpool, distant from 30-40 mi. In subsequent storms, DALTON found that ther was 1 grain of salt water in 200 grains of rain water, and that the salt water had been brought me chanically by the wind at least 30 mi." *Subject Headings:* **1. Salt in rainwater 2. Salt source 3. Manchester, Eng.**—*M.R.*

1829

12G–2 551.577.1

Impurity of rain water. *American Journal of Science and Arts*, New Haven, 15:185, Jan. **1829** (Reprinted from *Ferrusac's Bull.*, Oct. **1827.**) **DLC** (Q1.A5)—A brief note on BRANDES' rainwate evaporation experiments. The total amount of water evaporated during the year was 360 ounces The total residuum of 2.75 grains contained resin, pyrrhin, mucus, hydrochlorate, sulphate an carbonate of magnesia, hydrochlorate of soda, sulphate and carbonate of lime, hydrochlorate o potash, oxide of iron and manganese, and ammoniated salt. *Subject Heading:* **1. Rainwater com position.**—*I.S.*

1847

12G–3 551.510.41:546.39 551.577.13:546.3

Liebig, J., **Liebig on manures vs. Boussingault and Kuhlmann.** *Farmer's Magazine*, Ser. 2 16:511, **1847. DA** (10 F224)—A note discussing the presence of ammonia in manure with a bri reference pointing out that it has been demonstrated that ammonia is a constituent part of th atmosphere, and that as such it is directly accessible and absorbable by all plants presumably whe it is brought down in rainwater. *Subject Headings:* **1. Ammonia in atmosphere 2. Ammonia i rainwater.**—*E.Z.S.*

1852

12G–4 551.577.13:546.3

Bineau, A., **Recherches sur la composition chimique des èaux de pluie recueillies dans l'hive de 1851–1852, à l'Observatoire de Lyon.** [Research on the chemical composition of rainwate collected in the winter 1851–1852 at the Lyon Observatory.] *Acadêmie des Sciences, Paris, Comp Rendus*, 34:357–359, **1852. DLC**—The results of observations at Lyon at the end of November 185 on the ammonia content of rainwater compared with similar observations by BARRAL at Paris a presented and the following conclusions drawn: 1. The ammonia content was somewhat larger tha the mean half-year value observed at Paris. 2. No trace of azotic-acid (nitrogen) was found a Lyons, due either to the seasonal void of electrical formation of azotic-acid or to an operation transformation in BARRAL's analysis. 3. Little rains or a dry period were richer in ammonia tha abundant rain and rainy periods. 4. The ammonia absorbed by acids exposed in the air was le outside Lyons than at the Observatory. 5. The ammonia and the carbonic acid abandoned by th free air was less in quantity at Caliere than that obtained by FRESENIUS at Wiesbaden. 6. Th opinion that snow is more disposed to charge of ammonia than rain needs to be taken with reserva tions. *Subject Headings:* **1. Ammonia in rainwater 2. Ammonia in snow 3. Azotic-acid 4. Franc**—*O.T.*

12G–5 551.577.13

Chatin, A., **On rain waters.** *American Journal of Science and Arts*, New Haven, 14(41):287, ov. **1852.** **DLC** (Q1.A5)—The observations of CHATIN with respect to the composition of rain-ater in France at different places are briefly noted. The composition of rainwater in Paris is iefly mentioned. The Paris rainwaters contain chlorides, sulphates, salts of lime and soda, etc. *ubject Headings:* **1. Rainwater composition 2. Chemical composition of rainwater 3. Paris, rance.**—*I.S.*

12G–6 551.577.13

Marchand, Eugene, **Analyses of snow and rain water.** *American Journal of Science*, New aven, Conn., Ser. 2, 14:263, **1852.** table. **DLC** (Q1.A5)—A brief note containing a table of the emical constituents and their amounts found in snow and rain in the months of March and April, 350 at Fécamp, France. *Subject Headings:* **1. Precipitation composition 2. Fécamp, France.** -*E.Z.S.*

1853

12G–7 551.577.13:546.15

Chatin, A., **Présence de l'iode dans les eaux pluviales, les eaux courantes, et les plantes des ntilles et des côtes de la Méditerranée.** [Presence of iodine in rainwater, rivers and plants of the ntilles and the Mediterranean coasts.] *Académie des Sciences, Paris, Comptes Rendus*, 37:958–59, **1853.** **DLC**—Arguments are presented showing the confirmation of the results of research on dine contrary to the seemingly opposite results of M. CASASECA at Havana and M. MARTIN at arseilles. As to CASASECA's conclusion on the lack of goiter at Havana it is demonstrated that imitive goiter is not generally observable in localities with water containing less than 1/30 mg of dine. Concerning MARTIN's observations: 1) About 1/250 mg iodine per liter was found in the inwater at Nice in the first fifth of Oct., in the cisterns of Cesse collected in the morning of Oct. , and in Montpellier the same evening; 2) Its presence was verified in the water from the vicinity Marseilles; 3) It is correct, in general, that the waters at the coast of France are less charged with dine than in the interior of the continent. *Subject Headings:* **1. Iodine in rainwater 2. Antilles Mediterranean Coast, France.**—*O.T.*

1854

12G–8 551.578.11 551.577.13:546.39

Lawes, J. B. and Gilbert, J. H., **On the amounts of, and methods of estimating ammonia and tric acid in rainwater.** *British Association for the Advancement of Science, Reports*, 24:70–71, **1854.** **LC** (Q41.B8)—Following a brief review of previous work, the authors consider the methods of alysis of rainwater. As general results they noted that the percentage of ammonia was generally ss in rain of thunderstorms; and when there had been a large fall of rain the amount of nitric acid emed to increase under the influence of storms. The results also indicate that the amount of trogen yielded by rainwater in the form of nitric acid was considerably greater than that which isted as ammonia. *Subject Headings:* **1. Rainwater analysis techniques 2. Thunderstorm fluences on composition of rain 3. Ammonia in rainwater 4. Nitrogen in rainwater.**—*O.T.*

1855

12G–9 551.577.13:546.39

Filhol, E., **Note sur la composition chimique de l'eau de pluie tombée aux environs de Toulouse ndant le premier semestre de l'année.** [A note on the chemical composition of rainwater which ll in the vicinity of Toulouse during the first quarter of the year 1855.] *Académie des Sciences, aris, Comptes Rendus*, 41:838–839, **1855.** table. **DLC**—The results of a careful analysis of about liters of rainwater for its ammonia content are presented in a table by months. The lesser nmonia content at Toulouse compared with that of other regions is due to the proximity of the a and to the winds. *Subject Headings:* **1. Ammonia in rainwater 2. Toulouse, France.**—*O.T.*

12G–10 551.577.13:546.39

Way, Thomas, **The atmosphere as a source of nitrogen to plants: being an account of recent searches on this subject.** *Royal Agricultural Society of England, Journal*, 16:249–267, **1855.** ble. Also his: **On the composition of the waters of land-drainage and of rains.** *Ibid.*, 17:123–162, **56.** 2 figs., 6 tables. Also his: **On the quantity of nitric acid and ammonia in rain-water.** *Ibid.*, :618–621, **1856.** 2 tables. **DLC**—The first paper lists average amounts of nitric acid and am-onia measured in France and Germany in air, rain and snow. In the second and third papers onthly amounts of nitric acid and ammonia at Rothamsted are tabulated for 1855 and 1856. The method of analysis is described in detail (with illustration of apparatus) in the second paper. *Subject Headings:* **1. Nitric acid in air 2. Nitric acid in precipitation 3. Ammonia in air 4. Ammonia in precipitation 5. Precipitation analysis techniques 6. France 7. Germany 8. Rothamsted, Eng.** —*G.T.*

1858

12G–11 **551.577.13**:546.175

*Boussingault, J. B., **Recherches sur la quantité d'acide nitrique contenue dans la pluie, le brouillard, la rosée.** [Research on the amount of nitric acid in rain, fog, and dew.] *Académie des Sciences, Paris, Comptes Rendus,* 46:1123–1129; 1175–1183, **1858.** 12 tables. **DLC**—Results of research at Liebfrauenberg from 1856 to 1857 on the nitric acid in rain, fog and dew are presented. The variations in the amount of nitric acid in rain, fog and dew at various times are pointed out. The amounts differ from the initial fall of precipitation to the final deposit. Snow and hail were also examined for their nitric acid content. Twelve tables of data are included. *Subject Headings:* **1. Nitric acid in rain, fog and dew 2. Liebfrauenberg, Alsace, France.**—*O.T.*

1861

12G–12 **551.578.11**:**551.510.41**

De Luca, S., **Recherches sur les matières organiques et minérales des eaux de pluie.** [Research on organic materials and minerals of rainwater.] *Académie des Sciences, Paris, Comptes Rendus,* 53:153–156, **1861.** 3 tables. **DLC**—The results of analyses of rain and snow at different altitudes around Pisa are presented in tables. The rainwater did not furnish sensible reactions of iodine but the atmospheric currents lifted from the soil almost all the minerals and organic elements. At 54 m altitude the rainwater did not contain phosphates or iodines which were absent at 18 m altitude but they could be found almost always in the waters collected next to or at short distances above the soil. Nitric acids and azotized materials were present in rainwater collected at any altitude. *Subject Headings:* **1. Nitric acid in rainwater 2. Phosphates in rainwater 3. Iodine in rainwater 4. Organic elements in rainwater 5. Pisa, Italy.**—*O.T.*

1864

12G–13 **551.578.11**:**551.510.41**

Bobierre, Ad., **Recherches sur la composition chimique de' l'eau pluviale recueillie dans les villes à diverses altitudes.** [Research on the chemical composition of rainwater in cities at different altitudes.] *Académie des Sciences, Paris, Comptes Rendus,* 58:755–757, **1864.** table. **DLC**—The results obtained at the Observatory of Nantes are shown in tables. Amounts of ammonia, nitric acid and sodium chlorides for each month of 1863 are tabulated. It is concluded that the content of rainwater varies from city to city and with altitude. The contribution of rainwater to soil fertility is noted. The amount of nitric acid in rainwater decreases with the increase in the amount of ammonia. *Subject Headings:* **1. Ammonia in rainwater 2. Nitric acid in rainwater 3. Nantes, France.**—*E.Z.S.*

1870

12G–14 **551.577.13**:546.39

*Rosing, A. and Wankel, G., **Amoniakmaengden i regn, sne, kilders, floders, og söers vand samt havvandet.** [Ammonia content in rainwater, snow, wells, rivers, lakes and oceans.] *Norske Videnskabers Selskabs, Trondheim, Skrifter,* 6:1–28, **1870.** 9 tables. **DLC**—The tabulated data on snow or rain were obtained at Aas Agricultural College, Aug. 1864–May 1865. Mean values of the 18 observations range from 0.11–1.81 mgr/l, with a total mean of 0.38 mgr/l. For comparison some results from other European stations (1852–1865) are shown. *Subject Headings:* **1. Ammonia in precipitation 2. Aas, Norway.**—*W.N.*

12G–15 **551.577.13**:551.510.41

*Smith, R. Angus, **Chemical climatology.** *Scottish Meteorological Society, Journal,* n.s., 3(25):2–11, **1870.** tables. **DLC** (QC851.S3)—Author suggests a department at some observatories for chemical climatology and meteorology. Studies suggested include analysis of air for gases, spores germs, dust, ammonia, etc. and of rain for NH_4, albuminous matter, Cl, H_2SO_4 and HN O_3. Data are given for rain collected in 1869 at Darmstadt, Zivinfenberg, Heidelberg, North Uist, Tyree Kelly, St. Helens and Manchester, and for another period at 8 places in Great Britain as far north as the Shetlands. Pertinent remarks are made concerning all of these observations. *Subjec Headings:* **1. Chemical climatology 2. Chemical analysis of precipitation 3. Rainfall analysis data 4. NH_4 in rain 5. Great Britain 6. Germany.**—*M.R.*

1871

12G–16 **551.577.13**:546.175

Chabrier, M., **Dosage des acides nitreux et nitriques dans les eaux de pluie.** [Dosage of trous and nitric acids in rainwater.] *Académie des Sciences, Paris, Comptes Rendus*, 73:485–488; 73–1274, **1871.** table. **DLC**—The results, complementing those of experiments on the presence of ric acid in the soil, confirm the results obtained by applying the same experiments to the conents, to the chalks, and to irrigation water. The experimental results from Jan. 22 to July 12, 70 are presented in a table, and the applied method is described. The amount of nitrates, although w, influences vegetation. The ammonia nitrate deposited in the soil determines certain effects. ind and storm, the seasons, temperature, humidity and electricity are among the factors responsible the amount of nitric acid. *Subject Headings:* **1. Nitrous and nitric acid in rainwater 2. Rainter analysis techniques.**—*O.T.*

1872

12G–17 **551.510.41**:551.578.11

*Smith, R. Angus, **On the composition of the atmospheric air and rainwater.** *Chemical Society London, Quarterly Journal*, 25:33–34, **1872.** 3 tables. **DLC**—The amount of carbon dioxide and ygen in air was determined under a variety of circumstances and in different places. The results given in tables. Rainwater was chemically analyzed. (*Same item as* 3B-29, Feb. 1952, *Met. bs.*) *Subject Headings:* **1. Chemical composition of rainwater 2. Atmospheric chemistry.**—*N. A. keev.*

1877

12G–18 **551.510.41**:551.577.13:546.39

Lévy, A. A., **Dosages d'ammoniaque dans l'air et les eaux météoriques faits à Montsouris.** mmonia proportion in the air and meteoric waters at Montsouris.] *Académie des Sciences, Paris, mptes Rendus*, 84:273–276, **1877.** 3 tables. **DLC**—The method used to determine the ammonia sage in water and in air is described. The results for the second fortnight of January 1877 are esented in a table. The amount of ammonia found in the air and in meteoric waters of Montsouris each day of November and December, 1876 and January, 1877 and the amount of ammonia und in the water of the Seine and Vanne during the same period are also presented in tables. *bject Headings:* **1. Rainwater analysis techniques 2. Ammonia in rain water 3. Montsouris, ance.**—*O.T.*

12G–19 **551.510.41**:551.577.13:546.26

Truchot, P., **Sur la proportion d'acide carbonique contenu dans l'air atmosphérique pendant iver.** [Amount of carbon dioxide in the atmospheric air in winter.] *Annales Agronomiques, ris*, 3:69–73, **1877.** table, ref. **DLC**—Forty-nine measurements of carbon dioxide content in the were made from April 7 to 14, 1876. The mean value for clear days was 0.033 volume percent. e rainy days gave 0.046. Measurements made during the days with snow cover showed the gest mean value—0.056. It was found that each kilogram of snow brought 25.5 cubic centimeters carbon dioxide to the ground. (*Same item as* 3B-44, Feb. 1952, *Met. Abs.*) *Subject Headings:* **Carbon dioxide 2. Precipitation composition 3. Clermont-Ferrand, France.**—*N. A. Zikeev.*

1881–1883

12G–20 **551.577.13**:551.510.41

*Lawes, J. B.; Gilbert, J. H. and Warington, R., **On the amount and composition of the rain and ainage waters collected at Rothamsted.** *Royal Agricultural Society of England, Journal*, 17:241–9; 311–350, **1881.** 35 tables. **DA** (10 R81), **DLC** (S3.R835)—The paper is divided into 4 parts: . 1 treats the amount and composition of rainfall; Pt. 2 considers results relating to drainage and aporation from uncropped land; Pt. 3 deals with drainage water from cropped and manured land d Pt. 4 deals with agricultural peoples. In rainwater collected in the country nitrogen and oxygen e the gases chiefly present, with a small quantity of carbonic acid, and a still smaller amount of rbonate of ammonium. Rain also contains various solid substances gathered from the atmosphere ring its descent. Some of these, as the chlorides, sulphates and nitrates of sodium, calcium and nmonium, are dissolved by the rain; others as particles of dust and soot, are merely mechanically ld, and give to rainwater its ordinary dirty appearance. The ammonia is derived from the decay animal and vegetable matter, both on land and in the ocean, and from the combustion of fuel, pecially coal. The air of towns is much richer in ammonia than that of the country. According to HLOESING, the ocean of the tropical regions is the most important source of atmospheric ammonia. the high temperature of tropical latitudes, the ammonia produced by the decay of organic matter ffuses freely into the atmosphere, and is carried by winds to all parts of the globe. In northern latitudes southerly winds are those richest in ammonia. The nitric acid present in the atmosphere is due in part to electrical agencies. Discharges of electricity in the air determine the combination of the nitrogen and oxygen of which the atmosphere is composed, nitrous acid being formed; ozone is at the same time produced, which is capable of oxidizing both nitrous acid and ammonia, nitric acid in each case resulting. A source of nitric acid, independent of electrical discharge, exists in the oxidation of ammonia by ozone and peroxide of hydrogen. De Saussine, Brandes and Liebig had called attention to the existence of ammonia and nitric acid in rainwater before the commencement of the Rothamsted experiments. Some initial determinations of the ammonia in rain were made at Rothamsted as early as 1846. Barral, in 1851, made determinations of both the nitric acid and the ammonia in the rain which fell in Paris during several months and in 1852 and Boussingault determined the ammonia in the rain collected at Liebfrauenberg in Alsace. Collections for 1853–1854 (Liebfrauenberg) show for the first 12 months a total rainfall of 29.014 in., containing nitrogen in the form of ammonia equal to 5.20 lbs per acre. The data show that the quantity of ammonia in rainwater is subject to very considerable variation. This difference is partly due to a variation in the quantity of ammonia present in the atmosphere. At Rothamsted the rain is apparently richest in ammonia in summer. On the whole, the proportion of ammonia falls as the amount of rain increases, the nitrogen existing as nitric acid follows a similar order of abundance. *Subject Headings:* **1. Nitrogen in rainwater 2. Ammonia in rainwater 3. Origin of N in rainwater 4. Tropical regions 5. Rothamsted, Eng.**—*E.Z.S.*

12G–21 551.577.13:546.39

Müntz, A. and Aubin, E., **De la distribution de l'ammoniaque dans l'air et les météores aqueux aux grandes altitudes.** [Distribution of ammonia in the air and hydrometeors at high altitudes.] *Académie des Sciences, Paris, Comptes Rendus,* 95:788–790, **1882.** table. **DLC**—The results of observations of the ammonia content at high altitudes, made at the summit of Pic du Midi at 2877 m by Schloering's methods, are presented. The results obtained at 6 o'clock each morning and evening between Aug. 16 and 23, 1882 are given in a table. The decrease of ammonia content at high altitudes is ascribed to the rarefaction of the air, to the absence of ammonia nitrates in the traverse layers and to the dry snow of high altitudes. Same layers are weaker than those descending to the surface of the soil, amassing their ammonia content by successive condensation. *SubjectHeadings:* **1. Ammonia in rainwater 2. Ammonia distribution 3. Pic du Midi, France.**—*O.T.*

12G–22 551.577.13:551.510.41

Gillman, F., **Salt rain and dew.** *Nature,* London, 29(738):172, Dec. 20, **1883.** 2 refs. **DLC**—The author writes that "Dr. Petzholdt of Dorpat University, who made a special study of south Russia, Caucasus and Russian Turkestan, established that the aqueous vapor in the atmosphere, due to the vaporation of sea and salt-lake water, usually contains chloride of sodium which is precipitated to the ground by rain and dew." At Giessen (Hesse), during a two year period, Liebig analyzed 77 rainfalls, all of which contained salt. (*Same as item* 3D–25, April, 1952, *Met. Abs.*) *Subject Headings:* **1. Dew composition 2. Precipitation composition 3. U.S.S.R. 4. Giessen, Germany.**—*N. T. Zikeev.*

12G–23 551.577.13:546.39 551.578.11:546.13

Lawes, J. B.; Gilbert, J. H. and Warington, R., **New determinations of ammonia, chlorine and sulfuric acid in the rain water collected at Rothamsted.** *Royal Agricultural Society of England, Journal,* 193:313–331, **1883. DA** (10 R81), **DLC** (S3.R835)—The 152 analyses of rain, snow, dew and hoar-frost, representing the daily collections from June 22, 1881, to Jan. 5, 1882, gave an average of 0.248 of nitrogen as ammonia per million of water; the extremes observed were 5.491 and 0.143. The variations are dependent on the richness of the atmosphere in ammonia and on the quantity of the rainfall; the smaller deposits containing the most ammonia. Analyses during two years of fresh monthly mixtures of rain gave an average of 0.316 of nitrogen as ammonia per million. Analyses of fifty monthly mixtures, a considerable number of them old, gave a mean of 0.340. The rain collected in the leaden gage at Rothamsted generally tends to increase in ammonia the longer it is kept. The rainfall of summer is generally richer in ammonia than that of winter. The nitrogen as ammonia annually supplied by rain per acre, reckoned from the daily determination of six months, is 2.374 lbs; from the analyses during two years of fresh monthly mixtures, 2.466 lbs; from the analyses of fifty monthly mixtures, many of them old, 2.662 lbs. The nitrogen as nitric acid is apparently, from Frankland's and Way's results, about 1.0 lb per acre, and the nitrogen, as organic matter, a similar quantity. The total combined nitrogen in the annual rainfall at Rothamsted would thus be about 4.5 lbs per acre. Six years' determinations of chlorine in monthly mixtures of rain give an average of 1.99 per million of water, or 14.92 lbs per acre, equal to 24.59 lbs of pure common salt. Two-thirds of the chlorides fall in the six winter months, Oct. to March. The minimum quantity falls in July and the maximum in Oct. and Nov. Determination of sulphuric acid in the rain of two years gave a mean of 2.41 per million (reckoned as anhydride) or 18.5 lbs per acre per annum. The sulphuric acid occurs in nearly equal quantity in summer and winter. *Subject Headings:* **1. Ammonia in rainwater 2. Chlorine in rainwater 3. Sulphuric acid in rainwater 4. Seasonal variation of composition of rainwater 5. Rothamsted, Eng.**—*E.Z.S.*

1887–1889

12G–24 **551.577.13**:546.13 **551.578.11**

Kinch, Edward, **Amount of chlorine in rainwater collected at Cirencester.** *Chemical Society, London, Transactions,* 51:91–92, **1887.** **DA** (382 L84t)—The determination of chlorine in rainwater collected at Cirencester was started in 1870 and continued to March 1886. The methods used and results obtained are given. It was noted that the amount of chlorides was nearly always greater in the winter months. The excess in the winter months is partly due to the greater amount of chlorides volatilized by the combustion of fuel. Results obtained at Rothamsted (Laws, 1883) are noted. *Subject Headings:* **1. Chlorine in rainwater 2. Rainwater analysis techniques 3. Cirencester, Eng. 4. Rothamsted, Eng.**—*E.Z.S.*

12G–25 **551.577.13**:546.39 **551.577.13**:546.175

*Failyer, G. H. and Willard, J. T., **Ammonia and nitric acid in atmospheric waters.** *Kansas. Agriculture Experiment Station, Annual Report,* 2:123–132, **1889.** 3 tables. **DA** (100 K13S)—Samples were tested for nitrogen in ammonia and nitric acid in each rain for the year March 3, 1888–Feb. 28, 1889 and the results are given along with a table giving the results for four years 1886–87, 1887–88, 1888–89, and 1889–90, by monthly averages. In summary it is shown that the total nitrogen mean for four years was 3.44 lbs/acre, nitrogen in ammonia mean for three years 2.63 lbs/acre and nitrogen in nitric acid mean for three years was 1.06 lbs/acre. From May 1887 to Sept. 1889, inclusive, the rainwater was tested for the presence of nitrites. There were 132 rains from April to September, inclusive. Nitrites were present in 86% of these. Results suggest less favorable conditions for the production or conservation of nitrites in winter than in summer. The relation of nitric acid to ammonia is greater in summer than in winter. It would seem then that nitrates, as well as nitrites, are deficient in winter. *Subject Headings:* **1. Ammonia in rainwater 2. Nitric acid in rainwater 3. Kansas.**—*E.Z.S.*

12G–26 **551.577.13**:546.175 **551.577.13**:546.39

Müntz, A. and Marcano, V., **Sur la proportion de nitrates contenus dans les pluies des régions tropicales.** [Distribution of nitrates contained in the rains of tropical regions.] *Académie des Sciences, Paris, Comptes Rendus,* 108:1062–1064, **1889.** **DLC**—The increase of the proportion of nitrates in hot countries is examined. All the rains at Caracas for the period 1883–1885 were analyzed. The richness of ammonia compared with that of temperate stations of low altitudes is ascribed to the exaggeration of electrical tensions and to frequent discharges causing the oxidation of nitrogen and to the higher altitudes of rain in the tropics. As shown by comparative tables, the abundance of nitrogen in an easily assimilated form contributes without doubt to the luxurious development of tropical vegetation. *Subject Headings:* **1. Nitrates in rainwater 2. Ammonia in rainwater 3. Caracas, Venezuela.**—*O.T.*

1890–1893

12G–27 **551.577.13**:551.510.41

*Kansas. State Agricultural College, Manhattan, **Ammonia and nitric acid in atmospheric waters.** (From report of Chemical Dept.) Its *Second Annual Report of the Experiment Station,* 1889, pub. **1890.** p. 123–132. 3 tables. **DLC**—In the winter of 1886 arrangements were made for collecting and analyzing rainwater at Manhattan, Kansas, and the results of 4 years of work are summarized in this paper. This was the first such work in the U. S. The rain gage was tin, copper lined lead, 1/5000 of an acre in area, square and with rim 18″ above ground. Analytical tables give dates of rains, depth, NH_3-N and NO_3-N in parts per million and grams per acre, and total N in grams per acre for nearly 70 occasions in 1888–89, ammonia varied from 0 to 10.38 ppm and NO_3 from .036 to 1.85 ppm, average .387 and .160 ppm respectively. Ammonia was 3.072 pounds per acre and NO_3 4.645 ppm. Total N was 1.627 g. or 3.58 pounds per acre. Monthly summaries are given for four separate years 1886–87, 1887–88, 1888–89 and 1889–90. *Subject Headings:* **1. Rainfall analysis data 2. Chemical analysis of precipitation 3. Ammonia in rainwater 4. Nitrates in rainwater 5. Manhattan, Kans.**—*M.R.*

12G–28 **551.578.11**:546.39

Marcano, V. and Müntz, A., **Ammoniaque dans l'atmosphère et dans les pluies d'une région tropicale.** [Ammonia in the atmosphere and in the rain of a tropical region.] *Académie des*

Sciences, Paris, Comptes Rendus, 113:779–781, **1891.** **DLC**—A comparison of the ammonia content as observed at Caracas with that in temperate latitudes shows variations due to causes which modify the proportion of nitric acid whose intermittent abundance coincides with the electric condition of the air, decreases the rate of ammonia as a gas by saturation and generates nitrates. It is suggested that ammonia of marine waters are in more active circulation in tropical than in temperate regions. *Subject Headings:* **1. Ammonia in rainwater 2. Caracas, Venezuela.**—*O.T.*

12G–29 **551.510.41**:551.578.11:546.39

Müntz, A., **L'ammoniaque dans les eaux de pluie et dans l'atmosphère.** [Ammonia in rain and in the atmosphere.] *Académie des Sciences, Paris, Comptes Rendus*, 114:184–186, Jan. 25, **1892.** 2 tables, 7 refs. **DLC** (Q46.A14)—The results of observations made jointly with V. MARCANO showed a more active circulation of ammonia in the vicinity of the equator than in temperate climates. ALBERT LEVY's seemingly contradictory results were derived without taking into consideration the effect of populated places polluting the atmosphere. *Subject Headings:* **1. Ammonia in rainwater 2. Ammonia in the atmosphere.**—*O.T.*

12G–30 551.**577.13**:546.17

Erwin, R. W., **Nitrogen in rainwater.** *Utah. Agriculture Experiment Station, Station Report*, **1893.** p. 252–253. **DA** (100 Ut1Sp)—During the years 1891 and 1892–93, the station made determinations of nitrogen in rain and the average composition was found to be as follows: 1) nitrogen as ammonia 1.58 ppm; 1.39 ppm, and 1.42 ppm; 2) nitrogen as nitric acid 0.12 ppm, 0.09 ppm, and 0.10 ppm, for the years 1891, 1892 and 1893, respectively. More nitrogen is found in the rain in this region than in England, but less than in Germany. *Subject Headings:* **1. Nitrogen in rainwater 2. Utah.**—*E.Z.S.*

12G–31 551.**577.13**:546.175

Petermann, A. and Graftian, J., **Combinaisons azotées contenues dans les eaux météoriques.** [Nitric acid combinations contained in rainwater.] *Belgium. Station Agronomique Gembloux, Bulletin*, No. 53, **1893.** **DA**—A note indicating that two papers, **Contribution à la question de l'azote** (37 p.) and **Recherches sur la composition de l'atmosphère** (79 p.) were published in *Royal Academy of Belgium*, Vol. XLVII, **1892.** *Subject Heading:* **1. Nitric acid in rainwater.**—*E.Z.S.*

1895–1897

12G–32 551.**577.13**:546.39 551.**577.13**:546.17

Tracy, S. M., **Ammonia in rainwater.** *Mississippi. Agriculture Experiment Station, Annual Report*, 8:102, **1895.** table. **DA** (100 M69)—A brief note giving the amounts of nitrogen as ammonia and nitrates in rainwater collected during 1894 and 1895 at the Mississippi A. & M. College Experiment Station. Though the amount, which is equivalent to 3½ or 4 lbs of ammonia to the acre per year is small, it is half as much as is usually applied in fertilizers. *Subject Headings:* **1. Ammonia in rainwater 2. Nitrates in rainwater 3. Mississippi.**—*E.Z.S.*

12G–33 551.**578.11**:551.510.41

*Harrison, J. B. and Williams, J., **Proportions of chlorine and of nitrogen as nitric acid and as ammonia in certain tropical rain waters.** *American Chemical Society, Journal*, 19:1–9, **1897.** 8 tables. **DLC** (QD1.A5)—During the years 1880–1885 determinations of the quantity of nitrogen present in the forms of nitric acid and ammonia were made on samples of rainwater which fell in Barbados, British West Indies, and in other islands of the West Indies. The proportions of combined nitrogen present in the rainwater in the forms of nitric acid and ammonia did not support previous ideas that tropical rainwater contains considerably higher proportions of combined nitrogen than does that of temperate climates. Results are compared with those obtained by others in New Zealand, Japan, Venezuela and Réunion. *Subject Headings:* **1. Chemical composition of rainwater 2. Chlorine in rainwater 3. Nitric acid in rainwater 4. Ammonia in rainwater 5. Barbados, British West Indies.**—*E.Z.S.*

1900–1904

12G–34 551.**578.11**:546.13

Kinch, Edward, **Amount of chlorine in rainwater collected at Cirencester.** *Chemical Society, London, Transactions*, 77:1271–1273, **1900.** **DA** (382 L84t)—Results from Oct. 1, 1886 to Sept. 30, 1900 are given. The total deposit of chloride was greater in winter than in summer. The yearly average deposit of common salt per acre for the past 26 years has been 36 lbs; for the past 14 years it has been nearly 30 lbs. This compares favorably with result of G. BELLUCCI (1888), N. PASSERINI (1893) and J. B. HARRISON (1890–1895). *Subject Headings:* **1. Chlorine in rainwater 2. Seasonal distribution of chlorine in rainwater 3. Cirencester, Eng.**—*E.Z.S.*

12G–35 551.577.13:546.17

*Vel'bel, B. M., **K voprosu o soderzhanii azota v atmosfernykh osadkakh.** [Problem of nitrogen content in precipitation.] *Zhurnal Opytnoĭ Agronomii*, St. Petersburg, 4(2):188–195, **1903.** 3 tables. German summary p. 194–195. **DLC**—Report on investigations made at the Agricultural Experimental Station at Ploti (Kamenets-Podolski) during 1900–1902. Summary gives following results of NH_3 content in different forms of precipitation (mg/l): in snow, 0.915; in rain, 0.964; in rime, 2.700; in hoar frost, 4.200; in dew, 5.000 and in fog, 5.570. Mean content in precipitation of all forms: NH_3—1.056 mg; HNO_2—0.035; HNO_3—0.193. (*Same item as* 3J–27, Oct. 1952, *Met. Abs.*) *Subject Headings:* **1. Chemical analysis of precipitation 2. NH_3 content in snow 3. NH_3 content in rain 4. NH_3 content in rime 5. NH_3 content in hoar frost 6. NH_3 content in dew and fog 7. Kamenets-Podolski, U.S.S.R.**—*N. T. Zikeev.*

12G–36 551.577.13:546.17

Abbe, Cleveland, **Nitrogen in rain water.** *Monthly Weather Review*, Wash., D. C., 32(12):566, Dec. **1904. DLC** (QC983.A2)—A reference is made to nitrogen brought down at Transvaal, Pretoria and Rothamsted. By way of analogy it is suggested that the agricultural peculiarities of special regions in the U. S. may also be due to nitrogen precipitation. *Subject Headings:* **1. Nitrogen in rainwater 2. Transvaal, South Africa 3. Pretoria, South Africa 4. Rothamsted, Eng.**—*I.S.*

12G–37 551.577.13:551.510.41

Pozniakov, A., **Opyt issledovaniia khimicheskogo sostava osadkov v zavisimosti ot meteorologicheskikh faktorov.** [Chemical composition of precipitation depending on meteorological factors.] *Zhurnal Opytnoĭ Agronomii*, St. Petersburg, 5:740–788, **1904.** tables, 4 refs. German summary.—The study was conducted at the Magnetic-Meteorological Observatory at Odessa from April–Dec. 1903. Data of 125 measurements are tabulated and compared with results obtained in England, Germany and Hungary. The average amount of NH_3 in snow and rain was 0.5–0.8 mg/l, 2.2 mg/l in rime and 3.5 mg/l in hoar frost. The maximum of NH_3 varied from 6 mg/l in dew to 0.9 mg/l in snow. HNO_2 was not found in 32 of 49 samples of dew, rime and fog, but averaged 0.4 mg/l in snow with a maximum of 0.9 mg/l. *Subject Headings:* **1. Chemical composition of precipitation 2. Odessa, Ukraine S.S.R.**—*SIPRE.*

1905

12G–38 551.578.11:546.17 551.578.11:546.39

Ingle, H., **Amounts of nitrogen as ammonia and nitrates in rainwater collected at Pretoria.** *Transvaal Agricultural Journal*, Pretoria, 4:104–105, **1905. DA** (24 T68)—The amount of combined nitrogen brought down in the rain in Pretoria during 1904–1905 was about double that brought down on the average at Rothamsted. After a long dry period, the first rains were excessively rich in combined nitrogen, while in wet weather the amount of nitrogen reached its minimum. Compared with Rothamsted results, Pretoria rain is very much richer in ammonia and slightly richer in nitric acid. The proportion of nitrogen as nitric acid found was smaller than was anticipated, but thunderstorms, which are supposed to favor the formation of oxides of nitrogen, were much less frequent during the year than is usual. Generally a high content of ammonia is accompanied by a high proportion of nitric acid, but not invariably so; after dry weather the rain is exceptionally rich in combined nitrogen; with heavy rain, the proportion of combined nitrogen becomes smaller than usual; and for a given total weekly rainfall, the proportion of combined nitrogen is greater when the total is made up of several showers than when it all falls on one day. *Subject Headings:* **1. Nitrogen in rainwater 2. Ammonia in rainwater 3. Nitrates in rainwater 4. Pretoria, South Africa.**—*E.Z.S.*

12G–39 551.577.7

†Jaufmann, J., **Über Radioaktivität von atmosphärischen Niederschlägen und Grundwässern.** [Radioactivity of atmospheric precipitation and ground water.] *Meteorologische Zeitschrift*, Berlin, 22:102–113, March **1905.** fig., 25 refs. **DWB**—Results of an investigation on the origin and duration of radioactivity in snow, rain and spring water at 4 locations in Germany are reported and the methods of investigation are described in detail. Freshly fallen snow was 2–5 times as radioactive as rain (on the basis of water equivalents). Snow cover lying on flat roofs lost all radioactivity in a period of 6–7 days, while that on the ground gradually lost radioactivity for about 11 days, but showed a noticeable increase in activity after about 17 days. The cause for the regeneration of radioactivity in the snow cover was traced to the lowering of barometric pressure, which released radioactive air from the soil capillaries. This barometric relationship was also shown in spring- and well-water measurements. Well water showed large values of radioactivity after long periods of freezing temperatures, but the radioactivity decreased when the ground thawed. *Subject Headings:* **1. Radioactive precipitation 2. Radioactive ground water 4. Germany.**—*SIPRE.*

12G–40 **551.578.11:551.510.41**

*†Miller, N. H. J., **The amounts of nitrogen as ammonia and as nitric acid, and of chlorine in the rainwater collected at Rothamsted.** *Journal of Agricultural Science*, London, 1(3):280–303, Oct. **1905.** 14 tables, 125 refs. **DA** (10 J822)—After a thorough historical review, the amount of N as NH_3, NO_3 and NO_2 in Rothamsted rain is summarized for 1853–56, 1881–85 and 1886–1901. Monthly averages from 1888–1901 are then tabulated as ppm, ppa and % occurring as NH_3 and N_2O_5. Comparison is made for rains of less than 1″ and over 4″ for 13 years (18 samples each). Amount in ppm is twice as great in low rainfalls as in high rainfalls. Comparison is made with results in various parts of the world, both tropical and nontropical. Amounts of nitrous and nitric nitrogen are compared for rain and for snow. Chlorine and sulphuric acid amounts are also compared for Rothamsted and 11 other places. At Lands End chlorine content was 218 ppm. Author cites 125 references including A. S. MARGGRAF who reported in *Chem. Schriften*, Berlin, **1761–67** the results of HNO_3, Cl and Ca in rainwater collected in 1749–50 and subsequently in snow. T. Bergman reported similar analyses in *Opuscula Physica et Chemica*, Leipzig, **1788–90** and T. de Saussure, in **Recherches chimiques sur la végétation,** Paris, **1804,** reported NH_4 in the atmosphere. R. Brandes, in **Beiträge zur Kentniss der Meteorowasser** in *Schweiggers Jour.-Chem.-Phys.*, 48:153–183, **1826** reported chlorine, sulphuric acid, ammonia and total solids. *Subject Headings:* **Chemical analysis of rainwater 2. Nitrogen and ammonia in rainwater 3. History of rainfall analysis 4. Rothamsted, Eng.**—*M.R.*

1906

12G–41 **551.577.13:546.13**

Jorissen, W. P., **Het chloorgehalte van regenwater.** [Chlorine content of rain water.] *Chemisch Weekblad*, Amsterdam, 3(42):647–649, Oct. 20, **1906.** 4 tables, 12 refs. **DLC**—A series of analyses of rainwater during 1906 at the observation station at Den Helder is tabulated and discussed briefly. Nine samples showed an average of 29.6 mgr chloride per liter; 154 samples yielded 32.5 mgr/l. Comparison with chloride content at 12 stations at different geographic locations is made. *Subject Headings:* **1. Chlorine in rainwater 2. Den Helder, Netherlands.**—*W.N.*

1907

12G–42 **551.578.41:546.17**

*Shutt, F. T., **The fertilizing value of snow.** *Royal Society of Canada, Transactions*, Ser. 3, 1(3):35–38, **1907.** tables. **DLC**—Freshly fallen snow was collected at the Central Experimental Farm near Ottawa (Ont.) in 1906–07 winter, and analyzed for its N content as free NH_3, albuminoid NH_3, NO_3 and NO_2. Free NH_3 constituted the most and albuminoid NH_3 the least of the total N. A winter's snow furnished about 1 lb N/acre. Total annual precipitation was estimated at about 4 lb N/acre. *Subject Headings:* **1. Nitrogen in snow 2. Ottawa, Canada.**—*SIPRE.*

1909

12G–43 **551.578.11:546.17**

Brunnish, J. C., **Fertilizing value of rainwater.** *Queensland. Dept. of Agriculture, Annual Report*, **1908/1909.** p. 59–60. table. **DA** (23 Q3)—Investigation of the amounts of combined nitrogen, in the forms of ammonia salts, nitrates and nitrites, supplied by rainfall, was carried out for 18 months. Three stations were chosen: one in northern Queensland with a tropical rainfall, the second in Brisbane with a coastal position, and the third at the Roma State Farm with a small rainfall. The results are given and then compared with data from other parts of the world. Comparison shows that although the annual rainfall varied between 26 in. collected at Bungeworgorai, and 75 in. at Kamerunga, the amount of combined nitrogen is practically the same, and also is practically the same in two stations in India and at Rothamsted. In the tropical rainfall at Cavins the nitrate nitrogen is larger than the ammonia nitrogen; the New Zealand rain shows quite an abnormally low amount of combined nitrogen with a large predominance of nitrate nitrogen. Rain at the beginning of showers contains more combined nitrogen than toward the end, and during heavy showers the amount of nitrogen is less than during light rain. *Subject Headings:* **1. Nitrogen in rainwater 2. Queensland, Australia.**—*E.Z.S.*

12G–44 **551.577.13**

*Aufray, ——, **Richesse des eaux de pluie en acide azotique et en ammoniaque au Tonkin** [Amount of nitric acid and ammonia in the rainfall of Tonkin.] *French Indochina. Service de la Statisque Générale, Bulletin Économique de l'Indochine*, 12(81):595–616, **1909.** tables. **NN**—As well as giving quantity of nitric acid and of ammonia found in the rainfall, the rainfall amount in mm and duration in hours on each recorded rain day are given, and some notes as to rainfall intensities in thunderstorms, typhoons, etc. Work consists mainly of tables with some discussion of chemical content of rain as observed, 1902–1909. (*Same item as* 5B–27, Feb. 1954, *Met. Abs.*) *Subject Headings:* **1. Chemical composition of rain 2. Rain intensities 3. Precipitation data 4. Tonkin, French Indochina.**—*H. P. Kramer & K. Martinoff.*

12G–45 551.578.11:551.510.41

Harrison, J. B., **Report of the Government analyst, 1909/1910.** *British Guiana. Dept. of Science and Agriculture, Report,* **1909/1910.** p. 15–18. **DA** (102.5 B77)—Determinations of chlorine, nitrogen in ammonia, and nitrogen in nitrates from 1890 to 1910. The annual mean rainfall during the twenty years during which records have been taken was 99 in.; the average rain water contained 5.162 milligrams of chlorine, .018 milligrams of N in ammonia salts and .034 milligrams of nitrogen in nitrates per liter of water at 84°F. During the twenty years the monthly ranges of variation in the constituents of the rain have been very wide—chlorine ranging from 1.770 to 37.131, nitrogen in ammonia from nil to 1.275 and nitrogen in nitrates from nil to .823 milligrams per litre of water at 84°. *Subject Headings:* **1. Chemical analysis of rainwater 2. Chlorine in rainwater 3. Nitrogen in rainwater 4. British Guiana.**—*E.Z.S.*

1910

12G–46 551.577.13:546.17

*Shutt, Frank T. (*Chemist, Dominion Exp. Farm, Ottawa*), **The nitrogen compounds in rain and snow.** *Royal Society of Canada,* [*Proceedings and*] *Transactions,* Ser. 3, Vol. 4, **1910.** Section 3, p. 55–59. 5 tables. **DLC** (AS42.R6)—First analysis in winter 1906–07 at Ottawa, continued uninterrupted since. Summary of 2 years ending Feb. 28, 1910. First to measure albuminoid nitrogen. During September and October 1908 extensive forest fires in Ontario, Quebec and Northern New York state gave so much smoke that the rain was unusually rich in N compounds and the totals for year were exceptionally high. Data for each month of the 2 years are tabulated and discussed separately. *Subject Headings:* **1. Chemical analysis of rainwater 2. Nitrogen in rain 3. Nitrogen in snow 4. Albuminoid nitrogen in rainwater 5. Ottawa, Canada 6. Quebec, Canada 7. New York.**—*M.R.*

1911

12G–47 551.577.13:551.510.41

*Crowther, Charles and Ruston, Arthur G., **The nature, distribution and effects upon vegetation of atmospheric impurities in and near an industrial town.** *Journal of Agricultural Science,* London, 4(1):25–55, May **1911.** 3 figs., 12 tables. Analysis of observations in 1906–1910 at Manor Farm, Garforth (Univ. of Leeds Experimental Farm) and in city of Leeds. Three years of data given for Garforth and 1 year at different places in Leeds. Ammonia and nitric acid (1906–09), albuminous nitrogen (1908–09), sulphate (1906–09), chlorine (1906–09), free acid (sulphuric acid) 1906–10, and chemical analysis of soils are given. *Subject Headings:* **1. Chemical analysis of rainwater 2. Chemcal analysis of soil 3. Nitrogen in rain 4. Sulphate in rain 5. Chlorine in rain 6. Ammonia in rain 7. Leeds, Eng.**—*M.R.*

12G–48 551.578.11

Gray, George, **Dissolved matter contained in rain water collected at Lincoln, New Zealand.** *Chemical Society of London, Journal,* 100(2):327–328, **1911.** table. **DA** (382 L84)—An analysis of the dissolved solids in a sample representing the year 1908–09 gave the following results: volatile solids, 2.37; K_2O, 0.77; Na_2O, 8.14; CaO, 1.35; MgO, 0.63; SiO_2, 1.60; SO_3, 2.86; Cl, 5.53 and CO_2, 1.7 per million of rain. Compared with the earlier analyses made in 1884–8 (*Austral. Assoc., Proc.,* 1:138, **1888**) the results show a slight increase in the amount of ammonia, and an increase in sulphates, due to the increase in population and manufactories. The chlorine is a good deal lower than in the earlier period, owing to diminished winds. A sample of rain (three days) from Campbell Island contained: total solids, 172.5; N in ammonia, 0.084; N in nitrates, 0.084 and Cl, 77.5 per million. Analyses of monthly samples of rain water from July 1907 to June 1909 are included. *Subject Headings:* **1. Rainwater analysis data 2. Composition of rainwater 3. Lincoln, New Zealand.** —*E.Z.S.*

12G–49 551.577.13:546.39

*Hall, A. D. and Miller, N. H. J., **On the absorption of ammonia from the atmosphere.** *Journal of Agricultural Science,* London, 4:56–68, **1911/1912.** 6 tables, 11 refs. **DLC** (S3.J84), **DA** (10 882)—A report on a study of the absorption of ammonia from the atmosphere. Tabulated data rom November 1908 to October 1910 shows a comparison of the amount of nitrogen absorbed per acre with the amount of nitrogen in rain. It refers to the previous study by N. H. J. MILLER (*see* 2G–40). *Subject Headings:* **1. Ammonia in rainwater 2. Nitrogen in rain.**—*E.Z.S.*

12G–50 **551.577.13**:546.17

Knight, Nicolas, **Nitrogen in rain and snow.** *Iowa Academy of Science, Proceedings,* 18:75–77, **1911.** 2 tables. **DA** (500 Io93)—Seventeen samples were collected at Mount Vernon, Iowa, in 1910. It was found that the least amount of nitrogen was present in the albuminoid ammonia, the most in the nitrates and nitrites. The nitrogen in the nitrites and nitrates is the most available form for plant food and the amount is doubtless dependent on the frequency and duration of thunderstorms. Free ammonia is greater in rain than in snow, while the albuminoid ammonia is approximately the same in both. In the nitrites and nitrates the average in rain was found to be 3.45 ppm and 6.04 ppm in snow. *Subject Headings:* **1. Nitrogen in rain and snow 2. Mt. Vernon, Iowa.**—*E.Z.S.*

12G–51 **551.577.13**:546.39

Müntz, A. and Laine, E., **L'ammonique dans les pluies et les neiges des stations d'observation de la Mission Charcot.** [Ammonia in rains and snows at observation stations of the Charcot mission.] *Académie des Sciences, Paris, Comptes Rendus,* 153:749–750, Oct. 23, **1911.** table. **DLC**—Four rain and 14 snow samples were collected near the South Pole and analyzed for NH_3 content. The date and location of the sample's origin and its NH_3 content are tabulated. NH_3 in snow samples varied from 0.15–1.52 mg/l of water. The NH_3 distribution in snows and rains near the South Pole is close to that observed for various European stations. *Subject Headings:* **1. Ammonia in rain and snow 2. Charcot, Antarctica.**—*SIPRE.*

12G–52 **551.577.13**:546.175

Müntz, A. and Laine, E., **Les nitrates dans l'atmosphère des régions australes.** [Nitrates of the atmosphere in southern regions.] *Académie des Sciences, Paris, Comptes Rendus,* 152(4):166–169, Jan. 23, **1911.** table, 3 refs. **DLC** (Q46.A14)—The results of MÜNTZ's research on the content of oxygen obtained during J. CHARCOT's expedition are presented. The theory of nitric compounds formed as a result of or during polar auroras was considered. The preliminary research and observations on CHARCOT's vessel were responsible for precise results. A table shows the correlation of precipitation and nitric acids between Jan. 28, 1909 and Feb. 3, 1910. The results do not show any observable difference from those in temperate regions, such as in Alsace, in England and at the top of the Pic du Midi. MÜNTZ and MARCANO obtained higher values in the intertropical zone at Caracas. The nitrates in the high latitudes of the Antarctic originated during electrical phenomena and were transported by winds in the northern regions. A connection with polar auroras, absent in the region of the voyage, could not be determined but SHAKLETON's expedition observed their frequent occurrence in the vicinity of the South Pole. *Subject Headings:* **1. Nitrates in rainwater 2. Southern Ocean.**—*O.T.*

12G–53 **551.578.11**:551.510.41

Vityn, I., **Amounts of chlorine and sulphuric acids in rain water.** *Chemical Society of London, Journal,* 100(2):432, **1911.** table. **DA** (382 L84)—The amounts of chlorine and sulphuric acid in rainwater were estimated in monthly samples, collected in eight different places, from April, 1909 to March 1910. The amounts of Cl, SO_3 and SO_2 are tabulated. In the St. Petersburg area the highest amounts of chlorine occur in spring and autumn, when sea winds predominate. The results obtained at St. Petersburg, Ochta, and Mariupol indicate that the sulphuric acid is chiefly derived from the combustion of coal and wood. *Subject Headings:* **1. Chemical analysis of rainwater 2. Chlorine in rainwater 3. Sulphuric acid in rainwater 4. Leningrad, U.S.S.R.**—*E.Z.S.*

1912

12G–54 **551.578.11**:551.510.41

*Hudig, J., **The amounts of nitrogen as ammonia and as nitric acid (and nitrous) in the rainwater collected at Vithuizermeeden, Groningen.** *Journal of Agricultural Science,* London, 4:260–269, **1912.** 3 figs., 4 tables. **DA** (10 J822)—Results of chemical analysis of rainwater made from 1908–1910 are presented. The relative proportion between nitrogen as ammonia and nitrogen as nitrates (and nitrites) averaged from 0.724 ppm to 0.237 ppm, or 75.3% to 24.7%. The relative proportion between ammonia and nitrates averaged 0.565 mgr: 0.182 mgr or 75.6%: 24.4%. *Subject Headings:* **1. Chemical analysis of rainwater 2. Nitrogen in rainwater 3. Groningen, Germany.**—*E.Z.S.*

1913

12G–55 **551.578**:546.17

Knight, Nicholas, **Nitrogen in rain and snow.** *Iowa Academy of Science, Proceedings,* 20:189–191, **1913.** 2 tables. **DA** (500 Io93)—During 1911, 1912, and 1913 twenty-seven samples of snow and rain were collected. Chlorine was found in each sample. The nitrate determinations were made by the phenolsulphonic method, which seems to give lower results than the reduction with nascent hydrogen. Results are tabulated. *Subject Headings:* **1. Nitrogen in rain and snow 2. Iowa.** —*E.Z.S.*

12C–56 551.578.11:551.510.41(09)

Miller, N. H. J., **Composition of rain-water collected in the Hebrides and in Iceland, with special reference to the amount of nitrogen as ammonia and as nitrates.** *Scottish Meteorological Society, Journal,* Ser. 3, 16(30):141–158, **1913.** 11 tables. **DLC** (QC851.S3)—Early ideas on the superiority of rainwater to any other form of water for vegetation are described. The first chemical analysis of rain water was made in 1674 by Barrichins of Copenhagen as reported by Hjarne (died 1724) in *Acta et Tentamina Chemica Holmiensia,* Sec. ii, p. 23, Stockholm, **1753.** Marggraf found CaCl and NO_3 in rain and snow collected in 1749–58 (Hist. Acad. Roy. Sci (1752) p. 131–7, Berlin, 1753). Scheele found ammonia in air (1788–89, Leipzig). Dalton found chlorides in rainwater at Manchester (storm of Dec. 5, 1822). The first regular field experiments to determine amount of nitrogen per acre was made at Rothamsted by Laws and Gilbert and by Way in 1853–56 and 1881–82. In 1887 a new series was begun and continued up to 1912; in 1864 the Prussian Government had analyses made at the Agricultural College and Experimental Station for several years; at Montsouris Observatory, Barbados and British Guiana 20 year series, beginning in 1876, 1886, and 1890 respectively were obtained. Rothamsted results to 1905 were published by the author in *Agr. Science, Journ.,* 1:280–303, 1905, together with all previous results (repeated in table of data for 60 stations in all areas). Results obtained in uncontaminated rain in north and west Scotland, with methods described (both for collecting and analysis) are tabulated in detail. These places Landale (1907–08), Butt of Lewis (1908–13) Monach (1910–13), show very small amounts of NH_3 and NO_3, especially when calculated in parts per million (owing to heavy rainfall). Barrahead (1910–13) and Iceland (1911–14) had similar results. Chlorine content is exceedingly high in some of these places, 750–760 parts per million average, (5700–6900 pounds per acre) as at Butt of Lewis and Barrahead, and extreme values of 3900 ppm in some places. Mountain and sea coast stations show correspondingly low nitrogen content. *Subject Headings:* **1. History of chemical analysis of rainwater 2. Chemical composition of rainwater 3. Hebrides Islands 4. Iceland.**—*M.R.*

1914

12G–57 551.577.13:546.13

Dole, R. B. (*Geological Survey*), **Note on the chlorine content of rain water at Tortugas, Fla.** *Washington Academy of Sciences, Journal,* 4(1):3–4, **1914.** ref. **DLC** (Q11.W32)—A large sample of rain was collected at the Marine Biological Laboratory, Loggerhead Key, Tortugas, Fla. The test showed a chlorine content of 2.9 parts per million which is equivalent to about 5 parts of sea salt. Taking the annual precipitation into consideration this is equivalent to a precipitation of 65 pounds of salt per acre per annum. *Subject Headings:* **1. Chlorine in rainwater 2. Tortugas, Fla.**—*I.S.*

12G–58 551.578.11:551.510.41

*Juritz, C. F., **Chemical composition of rain in the Union of South Africa.** *South African Journal of Science,* Cape Town, 10:170–193, **1914.** plate, 6 tables. **DA** (515 So84)—The collection of samples from Cape Province, Transvaal, Orange Free State and Natal was undertaken in 1910, 1911 and 1912. The data collected are given in tabular form. Methods used in testing for chlorine, sulphur trioxide, ammonia and nitrogen are explained. In four cases it was possible to make a comparison between summer and winter rains. In each of these more nitric nitrogen was brought down by the summer than by the winter rains, and ammonia nitrogen was also larger in amount during the summer than during the succeeding winter months at Grahamstown and at Durban; at Bloemfontein considerably more nitrogen was brought down as ammonia in winter than in summer during 1910–1911, but during the succeeding year amounts determined at Bloemfontein also fell into line with amounts at the other localities. *Subject Headings:* **1. Chemical composition of rainwater. 2. Union of South Africa.**—*E.Z.S.*

12G–59 551.577.13:546.175

Wiesner, G. H., **Nitrogen and chlorine in rain and snow.** *Chemical News,* London, 109:85–87, **1914.** 2 tables. **DA** (382 C42)—Analyses were made of 31 samples of rain and snow at Mount Vernon, Iowa, from Feb. 22 to June 5, 1912. The average of the free ammonia in snow was 3.35 ppm and in the rain 0.931 ppm. The albuminoid ammonia in snow was 3.84 ppm and in rain 1.13 ppm. The nitrogen nitrite in snow was 0.0021 ppm and in rain 0.0018 ppm. In snow the average for the nitrates was 0.19 ppm and in rain 0.15 ppm. The average of chlorine in snow was 4.7 ppm and 4.8 ppm. The source is doubtless the sodium chloride of the Atlantic ocean. *Subject Headings:* **1. Nitrogen in rain and snow 2. Chlorine in rain and snow 3. Mount Vernon, Iowa.**—*E.Z.S.*

1915

12G–60 551.578.11:551.501.9 551.515.8:551.577.13:546.17

§*Anderson, Valentine G., **Influence of weather conditions upon the amounts of nitric acid and of nitrous acid in the rainfall at and near Melbourne, Australia.** *Royal Meteorological Society, Quarterly Journal*, 41(174):99–122, April **1915**. 11 figs., 2 tables. **DLC.** Summary in *Monthly Weather Review*, 43(7):345–346, July **1915** reprinted from *Report on Eighty-Fourth Meeting BAAS*, Australia, **1914**, London **1915**, p. 338–339. **DWB**—The report reviews the history of the detection and analysis of nitric acid in air and rainfall from Lavoisier and Liebig at the beginning of the 19th century to the systematic analyses made in France, Japan, New Zealand, Venezuela, Réunion, and at several places in the U. S. and the British Isles toward the end of the century. The origin of nitrogen, attributed by CAVENDISH to lightning, by GILBERT to soil emanations, by SODDY to radiation from natural radium, and by others to dust, is discussed and the chemical reactions formulated. Results of research performed in Melbourne and at Canterbury (6 mi from Melbourne), during Aug.–Oct. 1912, and daily analyses of samples obtained from Nov. 1912–Oct. 1913 are given. Rain gages with glass funnels 10″ in diameter and glass reservoirs were used to collect samples. One station was on roof of a tall downtown building and one on a grass plot in a suburb. Methods of analysis are reviewed and results given in a table in terms of NO_3—N, NO_2—N, NO_3/NO_2 and NO_3 NO_2 in mg/100 liters and in pounds/1000 acres. Seasonal and annual totals and means are tabulated and monthly values shown on a graph in correlation with total rainfall. Advantages of daily analysis compared with cumulative (monthly or seasonal) analysis are pointed out. A set of hyperbolic curves (isoazotes) shows the relation between the amount/100 acres and the weather type. Three antarctic types, 3 tropical types and 3 intermediated types of weather or air mass are designated, and 9 a.m. synoptic charts for Australia are classified for correlation with nitrogen precipitated. A systematic correlation was found: the amount of N was found to be independent of amount of rain or time between rains, but distinctly dependent on air mass or circulation type, ranging from 1.5 pounds per 1000 acres for the Antarctic, to 3.5 for tropical air rains which are always associated with electrical disturbances. Local thunderstorms did not give high N values, so it was assumed that the effect of lightning was cumulative and that the greater part is precipitated by the first .05″ which falls. Nitrogen content seemed to be constant for each air type before rain began, so it is assumed that origin and trajectories of air currents from the tropics or Antarctic could be identified by nitrogen content; also one could predict the amount of N contributed to soil in any given place by a statistical analysis of rainfall. Ratios of NO_3—N to NO_2—N are significant, being highest in summer and near unity in winter, indicating that high temperature produces rapid transformation of NO_2 to NO_3 so that NO_3 is greatest in summer and least in winter, and NO_2 is greatest in winter and least in summer. A discussion by E. J. RUSSEL of Rothamsted, Eng. expresses regret at ignoring ammonia content. Evidence points to nitrogen peroxide as source of both nitric and nitrous acids in rainwater as this gas reacts with water forming HNO_3 and HNO_2 in equal molecular proportions:

$$O_2 + N_2 \rightarrow 2NO$$
$$O_2 + 2NO \rightarrow 2NO_2$$
$$2NO_2 + H_2O \rightarrow HNO_3 + HNO_2$$

Subject Headings: **1. Rainfall analysis networks, Australia 2. Air mass-nitrogen relationships 3. Nitrogen in rainfall 4. Australian air mass types 5. History of rainfall analysis 6. Melbourne, Australia 7. Australia.**—*M.R.*

12G–61 551.577.13:546.175 551.577.13:546.13

Knox, William K., **Nitrogen and chlorine in rain and snow (second paper).** *Chemical News*, London, 111(2880):61–62, Feb. 5, **1915**. 2 tables. **DLC** (QD1.C5)—Forty-three samples (36 rain and 7 snow) collected at Mt. Vernon, Iowa, from Oct. 4, 1913 to June 12, 1915, gave constant chlorine content 10.6 ppm. Daily results of rainfall, Cl, NO_3, NO_2, free NH_3, alb. NH_3 and SO_3 tabulated in ppm and lb per acre. *Subject Headings:* **1. Nitrogen in rain and snow 2. Chlorine in rain and snow 3. Mt. Vernon, Iowa.**—*M.R.*

12G–62 551.577.13:546.17

Masson, Orme; Anderson, V. G.; Avery, D. and Hunt, H. A., **The influence of weather conditions upon the amounts of nitrogen acids in the rainfall and atmosphere in Australia.** *British Association for the Advancement of Science, Reports*, 85:87–94, **1915**. **DLC** (Q41.B8)—The research reported here is a continuation of the earlier work (*see* 12G–60). Samples of rainfall were collected from all parts of Australia and observers made notes of the weather conditions on the days the samples were obtained. Methods and procedures are explained and the equipment shown in sketches. Samples were collected from March 1915 to March 1916 but results were not available at the time of publication of this report. The results were to be reported in (V 86:128–129, 1916). *Subject Headings:* **1. Nitrogen in rainwater 2. Weather influences on nitrogen in rain 3. Australia.**—*E.Z.S.*

1916

12G–63 551.577.13:551.510.41

Artis, Bonnibal, **Nitrogen, chlorine and sulphates in rain and snow.** *Chemical News*, London, 113:3–5, **1916.** 2 tables. **DA** (382 C42), **DLC** (QD1.C5)—From Oct. 12, 1914 to June 19, 1915, the investigations made by Knox were continued. There were 35 cases of rain and sixteen of snow, or 15.35 in. of rain and 37.5 in. of snow, equivalent to 18.49 in. of rain. The heaviest rainfall, 1 in., occurred May 20 and the largest amount of snow, 8 in., fell on Dec. 29. The largest amounts of sulphates were found during the months of November and April, 28 and 28.5 parts per million, respectively. Of the various substances determined, the chlorine was the most constant, 7.1 parts per million in thirty determinations. *Subject Headings:* **1. Nitrogen in rain and snow 2. Chlorine in rain and snow 3. Sulphates in rain and snow.**—*E.Z.S.*

12G–64 551.515:551.577.13:546.17

Masson, Orme; Anderson, V. G. et al., **The influence of weather conditions upon the amounts of nitrogen acids in the rainfall and atmosphere in Australia.** *British Association for the Advancement of Science, Reports*, 86:128–129, **1916,** pub. 1917. Summary in *Monthly Weather Review* 45(10):501, Oct. **1917. DLC** (Q41.B8)—During the period March 15, 1916 to March 31, 1916, daily samples of rainwater were collected from 16 widely separated stations in Australia and these were examined for the determination of the amounts of nitric and nitrous nitrogen. It was found that for a given type of weather the concentration of oxidized nitrogen in the rainfall varies inversely as the amount of rainfall. The total amount of oxidized nitrogen per unit found in the rainfall accompanying a storm depends upon the type of weather, and is practically independent of amount of rainfall. The results obtained confirm experimental work reported by V. G. Anderson (*see* 12G–60). *Subject Headings:* **1. Nitrogen in rain 2. Weather influences on nitrogen in rain 3. Australia.** —*E.Z.S.*

1917

12G–65 551.577.13:546.264

Loske, E. G., **Otnoshenie pochvy k atmosfernomu vozdukhu i pochvennyĭ vozdukh.** [Relation of the soil to the atmospheric air and the air of the soil.] *Trudy po Sel'skokhoziaistvennoĭ Meteorologii*, Moscow, 7:601–689, **1917.** tables, refs. **DLC, DWB**—Discussion of the problems connected with carbon dioxide in the air of the atmosphere and in the air of soil. Precipitation analyzed and the average content of carbon dioxide determined as 2 cubic cm in 1 liter. (*Same item as* 3B–157, Feb. 1952, *Met. Abs.*) *Subject Headings:* **1. Carbon dioxide in precipitation 2. Soil air 3. Rainwater analysis.**—*N. A. Zikeev.*

12G–66 551.577.13:551.510.41

Peck, E. L., **Nitrogen, chlorine, and sulphates in rain and snow.** *Chemical News*, London, 116:283–284, Dec. 14, **1917.** tables.—A total of 41 samples of snow and rain were analyzed at (Mt. Vernon, Iowa) from Oct. 20, 1916 to June 8, 1917. The samples were tested for Cl, SO_3, NO_3, NO_2 and N in free and albuminoid NH_3. The results are expressed in ppm and lb/acre in 2 tables. *Subject Headings:* **1. Nitrogen in rain and snow 2. Chlorine in rain and snow 3. Sulphates in rain and snow 4. Mt. Vernon, Iowa.**—*SIPRE.*

12G–67 551.577.13:546.21

Richards, Eric Hannaford, **Dissolved oxygen in rain, Rothamsted Experiment Station.** *Journal of Agricultural Science*, Cambridge, 8:331–337, **1917.** 2 figs., 2 tables, ref. **DLC** (S3.J84), **DA** (10 J822)—Data were collected for one year (1915) at Rothamsted and are tabulated here. Several tests were made under varying conditions and it was found that rain water is very nearly saturated with oxygen when its temperature is below 15°C, as is the case for about nine months in the year in this climate. When the temperature of the rain is above 15°C, the dissolved oxygen is always below saturation, occasionally as much as 25%. *Subject Headings:* **1. Oxygen in rain 2. Rothamsted, Eng.**—*E.Z.S.*

1918

12G–68 551.577.13:546.11

Gassmann, Th., **Über das Vorkommen von Selenwasserstoff im Regen und im Schnee.** [The occurrence of hydrogen selenide in rain and snow.] *Helvetica Chimica Acta*, (Basel?), 1:52–54, **1918.** 3 refs.—Chemical analyses of 1 liter of filtered rain or snow water concentrated to 80 cc are described. H_2Se was detected by paper treated with Pb acetate. Also comment by Karrer, P. *Ibid.*, p. 499.—Gassmann's experiments were repeated and it is concluded that Se is not present in snow or rain. *Subject Heading:* **1. Hydrogen selenide in rain and snow.**—*SIPRE.*

12G–69 **551.577.13:546.25**

Kuppers, E., **Der Schwefelsäure inhalt des Schnee und Regenwasser.** [The sulphuric acid content of snow and rainwater.] *Zeitschrift für Angewandte Chemie*, Germany, 31(1):74–76, **1918.** tables.—The H_2SO_4 content of freshly fallen snow and rain depends on the proximity of industrial centers and the prevailing wind direction. Fresh snow in an industrial district contains an average of 15–20 mg SO_3/kg. Fresh rainwater collected in an open space in an industrial district contained 17–18 mg SO_3/l. Distilled water exposed to the air in an industrial district absorbed about 1.2 mg SO_3/100 sq m in 24 hr. *Subject Heading:* **1. Sulphuric acid in rain and snow.**—*SIPRE.*

12G–70 **551.577.13**

Peck, E. L., **Nitrogen, chlorine and sulphates in rain and snow.** *Monthly Weather Review*, Wash., D. C., 46(5):211, May **1918.** table, ref. **DLC** (QC983.A2). Reprinted from *Science Abstracts, Sec. A*, March 31, **1918.** p. 239.—Continuing the observation made by Artis, the author reports on 33 cases of rain and 8 cases of snow that were observed during Oct. 20, 1916 to June 8, 1917. The names of the substances found are presented in tabular form. *Subject Headings:* **1. Nitrogen in rain and snow 2. Chlorine in rain and snow.**—*I.S.*

12G–71 **551.577.13:551.510.41**

Shippee, V. C. and Fordyce, L., **Substances dissolved in rain and snow.** *Chemical News*, London, 117:322–323, Oct. 11, **1918.**—A total of 41 samples of snow and rain were analyzed at (Mt. Vernon, Iowa) from Sept. 29, 1917 to June 1, 1918. The highest amounts of SO_3 were obtained during the winter, possibly due to burning S-containing coal. Tests for P_2O_5 were positive, for CO_2 negative. Increased amounts of NO_3 were not found in precipitation during electrical disturbances. *Subject Headings:* **1. Chemical composition of rain and snow 2. Mt. Vernon, Iowa.**—*SIPRE.*

12G–72 **551.577.13:546.17**

*Shutt, Frank T. and Dorrance, R. L., **The nitrogen compounds in rain and snow.** *Royal Society of Canada, [Proceedings and] Transactions*, Ser. 3, Vol. 11, Dec. **1917**/March **1918.** Section 3, p. 63–72. 5 tables. **DLC** (AS42.R6). Summary in *Monthly Weather Review*, 47(12):878, Dec. **1919.** Reprinted from *Science Abstracts, Sec. A*, Feb. 28, **1919**, Sec. 146.—Summary of 10 years (1908–17) of work on N compounds in rain and snow at the Central Experimental farm, Ottawa, Canada (a non-industrial city), begun in 1907. Free ammonia, albuminoid ammonia, nitrates and nitrites are analyzed and factors influencing concentration, and agricultural importance are discussed. Average of 6.583 lbs N/acre/year furnished and largest amounts occur in April and May and in form most easily usable by plants. A lead-lined tray 60″×30″ was used to catch the rain which was conducted through glass tubing into a bottle inside the laboratory where analysis was made every day it rained, or twice a day (8 a.m. and 5 p.m.) if continuous precipitation. Snow was taken from freshly shoveled walk after each snow. No trouble was experienced from birds. During the decade 897 samples were analyzed (616 were rain and 281 snow). During September–November 1908 a very high ammonia content was found. It was a period of forest fires with eye irritation. In other cases no increase was found after 2 or 3 days of rain. Annual totals, regardless of rainfall (25″–40″) are remarkably uniform. Widest variation is in free ammonia. Rain was twice as rich in N as snow. Rain is a better solvent, but snow a better filter for solid particles. Hence the percentage of albuminois ammonia in snow is greater than in rain. 83% of total N is furnished by rain and 17% by snow. All told in 10 years 66 pounds of N (34 lbs free, 10 lbs alb NH_3 and 22 lbs of nitrates and nitrites) were furnished to each acre, total value—51.30 per acre. Tables give averages for each month and each year in parts per million, percentage of total and percentage per acre total and for rain and for snow, and proportion furnished by rain and snow. *Subject Headings:* **1. Nitrogen compounds in rain and snow 2. Rain water analysis techniques 3. Ottawa, Canada.**—*M.R.*

1919

12G–73 **551.578.11:551.510.41**

*Russell, E. J. and Richards, E. H., **Amount and composition of rain falling at Rothamsted.** *Journal of Agricultural Science*, London, 9(4):309–337, Oct. **1919.** 4 figs., 9 tables. Review in *Monthly Weather Review*, Wash., D. C., 49(3):159, March **1921.** **DWB**—Analysis of rainfall for 10 years (1905–15) showed NH_3—N and NO_3—N vary greatly with rainfall, the NH_3—N being about double the amount of NO_3—N. Since 1910 the NO_3—N had no simple relation to rainfall. Amount of NH_3—N averaged 2.64 pounds per acre, most in May–August and least in January–April. Source of NH_3 was thought to be: 1) ocean, 2) soil, 3) pollution. On the basis of a graph showing variation of all elements, 1888–1916, soil is believed the most probable source. Cl amounted to 16 pounds per acre per year; most in winter (from ocean during gales). Cl and NO_3—N have shown steady increase since 1888 and NH_3 has decreased, but total N is constant. Ratio of chlorine to N in winter ain being high and the reverse in summer rains suggests maritime origin of winter rain and coninental origin of summer rain. *Subject Headings:* **1. Chemical analysis of rainwater 2. Rainfall omposition 3. Nitrogen in rainwater 4. Rothamsted, Eng.**—*M.R.*

12G–74 551.577.13:546.39 551.577.13:456.17

Shipley, J. W., **Ammonia and nitrous nitrogen in the rain water of South Alaska.** *Ohio Journal f Science*, Columbus, 19:230–234, **1919.** table. **DA** (410 Oh3)—"While engaged in the work of he 1917 Katmai Expedition of the National Geographic Society, opportunity was afforded for making bservations on the ammonia and nitrite content in the rainfall of Katmai and adjacent districts. Determinations were made on the Bering Sea side of the peninsular axis, on the Pacific slope, and on Kodiak Island. The most extended series of observations was made at our Base camp on Kashvik Bay during a very rainy period from Aug. 19 to Aug. 27." Results are found in the accompanying able. The almost complete absence of ammonia in the rainfall of southwestern Alaska is in striking ontrast with that found at a similar latitude in Europe. Nitrous nitrogen was present in every letermination but one. The presence of even a small quantity of nitrates (shown in table) in the ain water of a region devoid of thunderstorms, is highly interesting. One might expect that all nitrites would be transformed into nitrates in the presence of such oxidizing agents of the atmosphere s ozone and hydrogen peroxide. But instead, nitrites were found to the extent of 0.0035 ppm of ain water at the beginning of the rainfall. *Subject Headings:* **1. Ammonia in rainwater 2. Nitrous itrogen in rainwater 3. Katmai, Alaska.**—*Author's introduction & E.Z.S.*

12G–75 551.577.13:551.510.41

Trieschmann, Jacob E. (*Cornell College, Mt. Vernon, Iowa*), **Nitrogen and other compounds in rain and snow.** *Chemical News*, London, 119(3090):49, Aug. 1, **1919. DLC** (QD1.C5). Review in *Monthly Weather Review*, 47(11):807, **1919.**—Analysis of 46 samples of rainfall at Cornell College, Mt. Vernon, Iowa, October 1, 1918 to June 15, 1919, representing 22.25″ precipitation, gave 511.74 pounds Cl^- (842.15 lbs NaCl) 1.5 lbs SO_3 and 5.279 lbs NO_3 per acre. Phosphates (P_2O_5) amount o 0.0086 lbs/acre, Cl^- average 11.12 ppm (6.1 to 25.7 ppm) and N = 1.046 ppm with almost constant otals for 46 samples. Strong wind and lightning did not increase amount of N (May 6 and June 1 nd 3) but total N on these dates was increasingly high—highest in period May 6 and 7. Free $NH_3 = 0.407$ ppm; albuminoid $NH_3 = 0.366$, $NO_3 = 0.255$, $NO_2 = 0.018$ ppm. N decreased in coninual rain on June 1 to 6 from 0.4 to 0.2. An increased amount of N is supplied during growing eason. More N is found in rain than in snow. *Subject Headings:* **1. Nitrogen in rain and snow 2. Chemical composition of rain and snow 3. Mt. Vernon, Iowa.**—*M.R.*

1920

12G–76 551.577.13:551.510.41

Knight, N., **Substances dissolved in rain and snow.** *Chemical News*, London, 121:13–14, July 9, **920. DLC.**—A total of 29 samples of snow and rain were analyzed at Mt. Vernon, Iowa, from Oct. 9, 1919 to May 22, 1920. The samples were tested for SO_3, Cl and N as NO_3, NO_2, free NH_3 nd albuminoid NH_3. The total lb/acre were 51.0306 for SO_3, 48.1644 for Cl, 0.62841 for NO_3, .03725 for NO_2, 2.8642 for free NH_3 and 0.4974 for albuminoid NH_3. *Subject Headings:* **1. Chemical omposition of rain and snow 2. Mt. Vernon, Iowa.**—*SIPRE.*

12G–77 551.577.13:546.17

Peyriguey, Jacques, **Influence de la neige sur le développement de la végétation au printemps.** [Influence of snow on spring vegetation.] *La Nature*, Paris, 48:179–180, April 10, **1920.** Figs. ables. **DLC**—The daily temperatures of the air 20 cm above the ground and of snow at 10- and 0-cm depths are tabulated from Feb.–April. Temperature variations are much greater in the air han in the snow indicating the beneficial insulation of the snow cover. Evaluation of the N comounds added to the soil by 551 mm of combined rain and snow at Montsouris amounts to 14.860 kg f N/ha/yr. A combined 1621.7 mm of rain and snow enriched the soil at Mont-Aigonal by 43.736 kg N compounds per ha for the 6 month period from Dec. to May. *Subject Heading:* **1. Nitrogen in rain nd snow.**—*SIPRE.*

12G–78 551.577.13:546.22

Stewart, Robert, **Sulphur in relation to soil fertility.** *Illinois. Agricultural Experiment Station (at Illinois Univ.), Bulletin*, No. 227:99–108, **1920.** 4 tables **DA** (100 IL6S)—Though the main ortion of this paper deals with sulphur in relation to soil fertility, the sulphur content of rainfall is onsidered. The amount of sulphur added to soil by rainfall at the Illinois Experimental Station rom 1913 through 1919 is tabulated. From 40 to 51 pounds of sulphur was brought down annually n the rain water. As an average of the seven years 45.1 pounds of sulphur has been added annually, r 3.8 pounds monthly. *Subject Headings:* **1. Sulphur in rainwater 2. Illinois.**—*E.Z.S.*

1921

12G–79 551.577.13:551.51

Moore, William A. and Browning, Glen, **The substances dissolved in rain and snow.** *Chem* *News*, London, 122:51–52, **1921.** **DLC** (QD1.C5), **DA** (382 C42)—The precipitation in Mt. Vern Iowa, from May 31 to Aug. 13, 1920, was studied in the chemical laboratories of Cornell Coll There were 21 cases of precipitation and a total rainfall of 6.13 in. The precipitates were tested nitrogen in nitrates, nitrites, free and albuminoid ammonia, and phosphates. Phosphates showe trace, sulphates were found but chlorides were absent. The amount of nitrogen which fell dur the three month period was 0.76 lb per acre. *Subject Headings:* **1. Nitrogen in rainwater 2. Chem** **composition of rain 3. Mt. Vernon, Iowa.**—*E.Z.S.*

12G–80 551.577.13:551.510

Shaffer, Sherman (*Cornell College, Mt. Vernon, Iowa*), **Substances dissolved in rain and sn** *Monthly Weather Review*, Wash., D. C., 49(7):404–405, July **1921.** 2 refs., table. **DLC** (QC983. —Samples collected in enameled pans at an open spot near center of small town of Mt. Vern Iowa (pop. 2100) 17 mi from Cedar Rapids, a manufacturing city. Samples were analyzed as s as possible in the laboratory. From Aug. 18, 1920–June 1, 1921, 45 samples of rain and snow w analyzed (18.14″ rain and 34″ snow). Tables give analysis of nitrates, nitrites, free ammon albuminoid ammonia, SO_3, SO_2 and Cl in pounds per acre for each fall of precipitation. Nitra amounted to 0.60126 lb/acre or 0.3 ppm. Highest NO_2 content was 1 ppm on Jan. 4, 1921. Amou is influenced by length of time between rains as can be shown on correlation curve for the two paran ters. No seasonal variation was noted. Nitrate concentrates are greater when rainfall is less. nitrates are in form of free nitric acid. Nitrites $=0.03985$ lb/acre and highest was 0.03 ppm May 1921. Free ammonia $=1.48$ lbs and $Cl^- = 10.1$ ppm with highest 49.7 ppm, $SO_3 = 327$ lb/acre 29.9 ppm. *Subject Headings:* **1. Chemical composition of rain 2. Mt. Vernon, Iowa.**—*M.R.*

12G–81 551.577.13:546.17 551.577.13:546

Wilson, B. D., **Nitrogen in the rainwater at Ithaca, N. Y.** *Monthly Weather Review*, Wash., D. 49(7):405, July **1921.** ref. (This abstract is reprinted from *U. S. Dept. of Agriculture, Experim* *Station Record* 44(9), [1921?]. **DLC** (QC983.A2)—Average annual rainfall at Cornell Uni Ithaca, from May 1, 1915–May 1, 1920 = 29.31″. Soil received 12.51 lbs nitrogen per acre; 11.5 NH_3—N and 1.01 lbs NO_3—N. Ammonia varies from year to year and month to month, but NO_3— remains more constant. High N content corresponds to high precipitation. Spring and summ rain contain more N than fall and winter rain. Decrease in August (and September–October) w due to washing out of NH_3 by previous rains. Lightning did not seem to increase NO_3 conte Amount of NH_3 at Ithaca is larger than in other parts of the world. *Subject Headings:* **1. Nitrog** **in rain water 2. Ammonia in rain water 3. Ithaca, N. Y.**—*M.R.*

1922

12G–82 551.577.13:551.510.

De Sornay, P., **Rain water.** *Revue Agricole de l'Ile Maurice*, Port Louis, 1:78, **1922.** **D** (24 M44)—Rain water in the tropics is richer in N than in the temperate zone. In Mauritius contains from 2.14 to 4.11 mg SO_3, 3.00 to 4.57 mg Cl and 1.45 to 1.70 mg N per liter. *Subj* *Headings:* **1. Nitrogen in rain water 2. SO_3 in rainwater 3. Chlorine in rain water 4. Mauritiu** —*E.Z.S.*

1923

12G–83 551.577.13:546.17 551.577.13:546.

Fries, H. S. J., (*Cornell College, Mt. Vernon, Iowa*), **Substances dissolved in rain and sno** *Chemical News*, London, 126(3280):113, Feb. 23, **1923.** **DLC.** Also in *Iowa Academy of Scien* *Proceedings*, 30:375–378, **1923.**—Analysis of 4 samples of rain and snow at Mt. Vernon, Iowa, duri period September 19, 1921–June 2, 1922, total precipitation 7.46″ rain and snow gave total NO_3— 1.074 pounds per acre, 0.183 pounds NO_2—N, 1.843 pounds free NH_3, 1.327 pounds albuminoid NH SO_3 0.6919 pounds per acre, Cl 7.942 pounds per acre. *Subject Headings:* **1. Nitrogen in rainwat** **2. Ammonia in rainwater 3. Mt. Vernon, Iowa.**—*M.R.*

12G–84 551.577.13:546.

Gassmann, Th., **Über den Phosphorkomplex im Schnee und Regenwasser.** [The phosphor content in snow and rainwater.] *Schweizerische Naturforschende Gesellschaft, Verhandlunge* 104(2):129–132, **1923.** 2 refs. (Abstract only). **DLC**—The results of chemical analyses a reported and the investigation technique is described. Tests with ammonium molybdate show 8×0.0038 gm of $Mg_2P_2O_7$ to be present in 500 cc of snow melt water which equalled 0.017 gm P Similar values were obtained with CaO. *Subject Heading:* **1. Phosphorus in rain and snow.**—*SIPR*

12G–85 551.577.13:551.510.41

*MacIntire, W. H. and Young, J. B., **Sulfur, calcium, magnesium and potassium content and eaction of rainfall at different points in Tennessee.** *Soil Science*, Baltimore, Md., 15(3):205–227, Iarch **1923.** 8 tables, 9 refs. Summary, p. 225–226. **DLC** (S590.S6)—Measurements of sulphur t University of Tennessee (Knoxville) Experimental Station Farm were made from 1913 to 1921 in onnection with lysimeter investigations. Other stations in Tennessee where sulphur content was etermined were: Knoxville Weather Bureau Station, Ogden Farm, 7 mi west of Knoxville; Copperill Weather Station (elevation 1600 ft, extreme southeast Tennessee); McGhee Weather Station 35 mi southwest of Knoxville); Loudon Observatory (elevation 750 ft, 50 mi from Copperhill); Crossville Farm (1850 ft) on Cumberland Plateau; Columbia Experimental Station (central Tennesee) and Jackson Station Farm (in western Tennessee). Eight year average soluble sulfate sulfur was 1.5 pounds per acre at the University Farm and 94.5 pounds in the center of the city of Knoxville. 2-year average at Ogden Farm was 18.6 pounds. Three-year average at Copperhill (smelting plant earby) was 232.4 pounds per acre and at McGhee 24.2 pounds; Crossville 12.7 pounds; Loudon 19.3 ounds and Jackson 59.2 pounds. Chlorine and phosphate tests were made at two Knoxville points. odium, calcium, magnesium and potassium were also determined. Data are given in tables. Iethods of collection and analysis are also outlined. *Subject Headings:* **1. Chemical composition of ain 2. Tennessee.**—*M.R.*

12G–86 551.577.13:551.510.41

Woehlk, John H. (*Cornell College, Mt. Vernon, Iowa*), **Nitrogen and other substances in rain and now.** *Chemical News*, London, 127(3300):30, July 13, **1923.** **DLC** (QD1.C5)—Analysis of 41 amples (12 snow and 29 rain) collected at Mt. Vernon, Iowa, during 8 months, Oct. 1, 1922 to June , 1923, with 70″ of snow and 11.2″ of rain (17.21″ precipitation total). Totals were 20.35 lbs Cl^-, .57 lbs SO_3, 3.93 lbs N/acre, or Cl^- 3.54 to 28.1 ppm. Precipitation comes from east, it is believed, r from Atlantic Ocean. Nitrogen average =0.896 ppm and is constant. Electrical storms seem to e responsible for higher averages. Free NH_3 averaged 0.34; albuminoid NH_3, 0.264; NO_3—N, .46; NO_2—N, 0.397 and SO_3, 0.147 ppm. Heavy concentrations were found in lighter rains. uring continuous precipitation the total N diminished (Nov. 5–27, 1922). *Subject Headings:* **. Nitrogen in rain and snow 2. Chemical composition of rain 3. Mt. Vernon Iowa.**—*M.R.*

1924

12G–87 551.577.13:546.17

Freeman, J. F., **Nitrogen in the rainwater at different points in Kentucky.** *American Society f Agronomy, Wash., D. C., Journal*, 16(6):356–358, June **1924.** 3 tables, 3 refs. **DA** (4 Am34P)—ince collections of rainfall were being made at various points in Kentucky for the determination of ulphur, it was thought advisable at the same time to determine the amounts of nitrogen present. he rainfall was analyzed for periods of three months each. Results were obtained for 5 periods, eginning Jan. 1, 1922 and continuing through April 30, 1923. With an average rainfall of 42.76 in. r the year April 1, 1922 to April 1, 1923, the soil in six different locations in Kentucky received an verage of 18.78 pounds of nitrogen per acre. Of this amount, 11.61 pounds was in the form of mmonia nitrogen and 7.17 pounds was in the form of nitrogen. *Subject Headings:* **1. Nitrogen in inwater 2. Kentucky.**—*E.Z.S.*

12G–88 551.577.13:546.22

*Johnson, E. M., **Sulfur in rainfall in Kentucky.** *American Society of Agronomy, Wash., D. C., ournal*, 16(6):353–356, June **1924.** 4 tables, 10 refs, 10 refs. **DA** (4 AM34p)—Data from various uthors are presented together with the data of sulphur in rainfall in Kentucky for 1921 and 1922. he results indicate that the sulphur content of the rainfall is greater in the winter than in the summer. he location of the gage with reference to railroads and cities affects the sulphur content of the infall. *Subject Headings:* **1. Sulfur in rainwater 2. Seasonal distribution of sulfur in rainwater Kentucky.**—*E.Z.S.*

12G–89 551.577.13:551.510.41

Knight, N., **Substances in rain and snow.** *Iowa Academy of Science, Proceedings*, 31:325–326, **24. DLC**—Twelve samples of snow and 29 of rain were collected and analyzed from Oct. 1, 1922–une 1, 1923 at Mt. Vernon, Iowa. There were 70 in. of snow and 11.2 in. of rain. Th aggregate of e precipitation contained 20.35 lb of Cl, 0.57 lb of SO_3, and 3.93 lb of N per acre. Only traces of osphates were found. *Subject Headings:* **1. Chemical composition of rain and snow 2. Mt. ernon, Iowa.**—*SIPRE.*

12G–90 551.577.7

Obolenskiĭ, V. N., **Radioaktivnost'osadkov i gruntovykh vod.** [Radioactivity of precipitation and ound water.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, May 7–14, 1924, Trudy.* p. 414–416.—Investiga-

tions on radioactivity of precipitation were made near Leningrad during 2 yrs. Analyses of a
500 cases of precipitation indicated a greater radioactivity for snow than for rain. The rati
radioactivity of snow to rain averaged 5:3. Small precipitation amounts were more radioac
The maximum radioactivity was observed in Nov. and minimum in April. *Subject Head*
1. Radioactive precipitation 2. Leningrad, U.S.S.R.—*SIPRE.*

1925

12G–91 551.577.13:54

Ilkov, V., [**Nitrogen compounds in atmospheric precipitation.**] *Bulgaria. Zemediels*
Izpitatelni (Opitni) Instituti vu Bulgariia, Sofia, Spisanic, 3:325–338, **1925.** 9 tables, 3 eqs.
Bulgarian; German summary p. 338. **DA** (106.3 R32)—The results of three years of rain and sn
water analyses are presented. Tables show that 1186.19 g of nitrogen had been supplied in
form of ammonia and 68.998 g in the form of saltpeter acids, making a total of 1255.188 g of nitro
No connection can be derived, however, from the above mentioned analyses between the am
of ammonia of rainwater and the temperature of the atmosphere. In regard to the saltpeter ac
was determined that it is more apparent in rainwater in summer than in the snow-water of the wi
which can be explained by the fact that most precipitation of the summer is accompanied by lightn
Nitrogen and saltpeter acid are contained in dew and frost also, only the amount of nitrogen in
duced into the soil cannot be determined exactly, because the amount of dew-water cannot
determined exactly. However, part of the rainwater reaches the lower plants which take up the
trogen compounds, and another part of the rainwater evaporates before it can be utilized by the pla
It can be concluded that the entire amount of nitrogen supplied to the soil by precipitation is
than 1255.188 g. *Subject Headings:* **1. Nitrogen in rain 2. Nitrogen in snow 3. Sofia, Bulga**
—*Transl. of German summary* (*O.T.*).

12G–92 555.578.11:551.510

Johnson, E. M., **Analyses of rainfall from a protected and an exposed gage for sulfur, nitr**
nitrogen and ammonia. *American Society of Agronomy, Wash., D. C., Journal,* 17(10):589–
Oct. **1925.** 2 refs., table. **DA** (4 Am34P)—Rainfall from a gage protected from birds and from o
not protected was analyzed for a period of 15 months for sulphur, nitrate and ammonia. The to
amount of sulphur in pounds per acre for 15 months was 56.07 in the rainfall from the protected g
and 50.61 in that from the exposed gage. The nitrate in the rainfall for the same period was 0
pound per acre in the exposed gage and 0.71 pound in the protected gage. There was a total of 17
pounds per acre of ammonia in the water from the exposed gage and 9.81 pounds in that from
protected gage. *Subject Headings:* **1. Chemical composition of rain 2. Rainfall analysis techniqu**
—*Author's summary and E.Z.S.*

12G–93 551.577.13:546

Shutt, Frank T. and Hedley, B., **The nitrogen compounds in rain and snow.** *Royal Society*
Canada, [*Proceedings and*] *Transactions,* Ser. 3, Vol. 19, **1925.** Section 3, p. 1–10. 5 tables. **D**
(AS42.R6)—Summary of analysis of 1709 precipitation samples (1214 rain and 495 snow) ove
17 year period (1907–1924) at the Central Experimental Station Farm, Ottawa, Canada, and disc
sion of results. Tables show for each year the amount of rain, snow and total precipitation; t
N in ppm as free ammonia, albuminoid ammonia, nitrates and nitrites and the pounds of N p
acre (range from 4.3 in 1907 to 11.5 in 1923, average 6.9). Seasonal variations are also shown in
table for each element (maximum August—minimum February for total N). A comparison is ma
of amounts and proportions of N, furnished by rain and snow respectively, and the percent of N ea
year furnished by free ammonia, albuminoid ammonia and nitrates and nitrites in rain and in sno
Total N is equivalent to an application of 44 lbs of commercial nitrates per acre a year. *Subj*
Headings: **1. Nitrogen in rain and snow 2. Ottawa, Canada.**—*M.R.*

1926

12G–94 551.577.13:546.

*†Eaton, Scott, V. and Eaton, J. H., **Sulphur in rain water.** *Plant Physiology.* (American So
of Plant Physiology), Lancaster, Pa., 1(1):77–87, Jan. **1926.** Fig., 4 tables, 22 refs. **DA** (450 P69
—The data clearly show the influence of coal consumption on the amount of sulphur in rainwat
The rain falling at the station near Liberty, a good agricultural region, contained for the year le
than one fifth as much sulphur as was found at the Chicago station. At each place there was
marked seasonal variation, the largest amount of sulphur being in the winter rain. In regions whe
the amount of coal consumed is not great the evolution of hydrogen sulphide into the air may be
matter of considerable importance for the total sulphur brought to the soil by rain. The amount
sulphur added to the soil by rain varied directly with the rainfall, but the percentage sulphur conte

f the rain varied inversely with the amount of rain falling. *Subject Headings:* **1. Sulphur in rainvater 2. Seasonal distribution of sulphur in rainwater 3. Chicago, Ill.**—*Author's abstract.*

12G–95 **551.577.13**:**551.578.11**:**546.175**

*Hansen, Frode, **Om bestemmelse of nitratkvelstof i regnvand, draenvand og jord.** [Deternination of nitrate nitrogen in rainwater, drainage water and soil.] *Tidsskrift for Planteavl*, 32(1): 9–120, **1926.** 3 figs., 16 tables, 13 refs., eqs. Summary in English p. 119–120. **DLC**—Analyses of ainwater collected at intermittent periods during fall 1921 at Askov Experimental Station, Denmark re tabulated and discussed. The Rothamsted method gave reliable results; the phenol disulphonic cid method did not. If exposed to the air more than 2 days, the ammonia content of the collected ain water increases. No change occurs in nitrate and ammonia for 1–2 months if toluol or chloroorm are added to the samples which are kept in corked bottles in cool storage. *Subject Headings:* **. Nitrate nitrogen in rainwater 2. Askov Experimental Station, Denmark.**—*W.N.*

12G–96 **551.577.13**:**551.510.41**

Ribble, Harry and Bowman, Paul (*Cornell College, Mt. Vernon, Iowa*), **Substances in rains and nows.** *Monthly Weather Review*, Wash., D. C., 54(10):424, Oct. **1926.** table, 2 refs. **DLC** QC983.A2)—Results of quantitative analysis of precipitation at Cornell College, Mt. Vernon, Iowa, rom September 1924 to May 31, 1926, with results of 70 samples (13 snow) listed in table. Total recipitation, NO_3, NO_2, free NH_3, albuminoid NH_3, SO_3 and Cl content listed in pounds per acre. No comments on results but tables for each element are given for each of the two agricultural years. *Subject Headings:* **1. Chemical composition of rainwater 2. Mt. Vernon, Iowa.**—*M.R.*

1927

12G–97 **551.577.13**:**546.13**

Bordas, F. and Desfemmes, A., **La répartition et le transport des chlorures dans l'atmosphère.** [Distribution and transport of chlorides in the atmosphere.] *Académie des Sciences, Paris, Comptes Rendus*, 185(13):603–605, Sept. 26, **1927.** ref. **DLC**—On the basis of preliminary experiments howing the most frequent condensation of fog in successive layers on solid particles, a region situated n the South was chosen for the new experiments. The town of Cette presented the advantage of eing dominated by an isolated hill of 180 m permitting observation stations at various altitudes. The town of Varguières, 35 km from the sea at an altitude of 100 m served as operation center. The observations continued from October 25, 1925. The accumulated dust in different parts of the egion were examined. The observations at Varguières showed twenty times less dust than at Cette 5 km away. The first observations showed that the atmosphere can hold 8.41 g sodium chloride in uspension, carried by the rain, per m². The chlorine can be transported at much greater distances rom the sea than hitherto admitted. The feeble amplitudes of tides diminish the production of ertain coastal fogs which carry almost no chlorines, as distinct from spray which does so. *Subject Headings:* **1. Chlorine in rainwater 2. Geographic distribution of chloride 3. France.**—*O.T.*

12G–98 **551.577.13**:**546.17**

Golubchyk, V., **Pro kil'kist' azotovykh spoluk v atmosferykh opadakh.** [Nitrogen content in recipitation.] *Pogoda i Zhyttia*, Kiev, 4:81–83, May/June **1927.** table, ref.—Chemical analyses f precipitation during the winter of 1926–27 in Chernigov and the accompanying weather conditions re summarized. The maximum NH_3 content was found in rain (6 mg/l). The NH_3 in falling snow anged up to 1.33 mg/l, and from 0.42–1.42 mg/l in the upper layer of the snow cover. Values of HNO_2 ranged from 0.42 mg/l in rain to 0.08 mg/l in the snow cover. Hoar frost deposits contained rom 0.78–0.51 mg/l NH_3 and 0.01–0.02 mg/l HNO_2. *Subject Headings:* **1. Nitrogen in precipitation . Chernigov, Ukrainian S.S.R.**—*SIPRE.*

12G–99 **551.577.13**:**551.510.41**

*Hendricks, Robert W., **Analysis of the precipitation of rain and snow at Mount Vernon, Iowa (for 1926–1927).** *Monthly Weather Review*, Wash., D. C., 55(8):363, Aug. **1927.** 2 tables. Also Kynett, Lawrence and Lohner, John: **Chemical composition of rains and snows at Mount Vernon, owa (for 1928–1929).** *Ibid.*, 57(11):461, Nov. **1929.** Tables. And Stewart, Willard C.: **Analysis f the precipitations of rain and snow during 1929–1930 at Mount Vernon, Iowa.** *Ibid.*, 58(10): 18–419, Oct. **1930.** 2 tables. **DWB, DLC**—During 1926–30, the water was collected in granite ans 18 in. in diameter on a house top in Mt. Vernon, Iowa (pop. 1700). Results of 55 samples are iven for 1926–27, 46 in 1928–29, and 48 in 1929–30 in parts per million and pounds per cre. Methods of analysis are taken from **Standard methods of water analysis,** published by the merican Public Health Association in a laboratory devoted exclusively to water analysis (no mmonia allowed). This distillation method is used for free and albuminoid ammonia, and the

phenosulphonic method for nitrates. *Subject Headings:* **1. Rainfall analysis techniques 2. Chem**
composition of rain and snow 3. Mt. Vernon, Iowa.—*M.R.*

1930

12G–100 551.577.13

Potter, H. C., **Hydrion concentration of rain and potable waters.** *Nature*, London, 126:434–
1930. table. **DLC**—For the past year and a half the hydrion concentration (pH) of the rain w
at New Milton has been recorded together with the general wind direction. The data so far obta
indicate that wide variations in the pH are to be expected in the rain falling upon living plants.
pH of the water obtained from the collectors and from the plants varied between 5.5 and 7.6
practically all intermediate values. *Subject Headings:* **1. pH of rainwater 2. New Milton,**
—*E.Z.S.*

1931

12G–101 551.577.13:546.39 551.577.13:54

Braadlie, O., **Innholdet av ammoniakk og nitratkvelstoff i nedboren ved Trondheim 1928-**
[Content of ammonia and nitrate nitrogen in the precipitation at Trondheim 1928–29.] *No*
Videnskabers Selskabs, Forhandlinger, 3(20):78–81, **1931.** table, 6 refs. **DLC**—Investigations w
conducted at Trondheim Meteorological Station (100 samples) and at the Vall Experimental F
(85 samples). Tabulated results for each month are discussed and compared with similar obser
tions elsewhere, showing the total amount of nitrogen combinations to be lower at Trondhe
Influence of topography and wind direction on chemical combinations are reflected in these d
NH_3—N is greater in snow than in rain, continuous or heavy precipitation reduces chemical cont
and by the same token "washes" the air. *Subject Headings:* **1. Ammonia in precipitation 2. Nitr**
nitrogen in precipitation 3. Trondheim, Norway.—*W.N.*

12G–102 551.577.13:551.510

*Cottral, Lyle L., **Analysis of the precipitation of rains and snows at Mount Vernon, Iowa** (
1930–1931). *Monthly Weather Review*, Wash., D. C., 59(6):235, June **1931.** 2 tables. A
Wiliams, S. Francis and Beddow, O. Kenneth: **Analysis . . . (for 1931–1932).** *Ibid.*, 61(
141–142, May **1933.** 2 tables. And Hines, Leonard: **Analyses of the precipitations at Mo**
Vernon, Iowa, for 1932–1933. *Ibid.*, 62(3):90–91, March, **1934.** And Knight, Nicholas: **Analy**
of the precipitation of rains and snows at Mount Vernon, Iowa (for 1933–1934). *Ibid.*, 62(5):1
164, May **1934.** **DWB, DLC**—Under direction of NICHOLAS KNIGHT, analyses were made dur
the past 20–25 years at Mt. Vernon, Iowa. Thirty-four analyses were made in 1931–2, 48 in 1932
43 in 1933–4. Appropriate comments are made whenever duststorms, lightning, drought or prolon
rains affect the analyses. Data are given in parts per million and pounds per acre. The depress
affected the burning of coal and wood was burned instead. As a result the SO_3 was at an all time l
in winter of 1932–3. *Subject Headings:* **1. Chemical composition of rain and snow 2. Weat**
influences 3. Mt. Vernon, Iowa.—*M.R.*

12G–103 551.578.11:551.510.

Farcy, L., **La composition des eaux de pluie de la région de Brest et du Nord Finistère.** [Co
position of rain water in the Brest region and in North Finistère.] *Annales d'Hygiène Publiq*
Industrielle et Sociale, Paris, n.s., No. 9:504–518, Sept. **1931.** tables. **DLC** (RA421.A6)—Continui
with investigations similar to those of BORDAS and DESFEMMES, reported at the Académie des Scienc
Sept. 26, 1927, on the distribution and transport of chlorides in the atmosphere, the results of th
consecutive investigations from 1928 to 1931 are presented. The geographical components o
stations are stated for which the monthly and annual means are presented in a table accompani
by a sketch and a pluviometrical chart of the respective regions in the investigation of 1928–192
including tables of soluble and insoluble quantities and of minima and maxima. The investigati
of 1929–30, in part devoted to measuring the distances of transport, gives the altitudes and distanc
of the stations from Brest, also gives monthly values, the volumes of water and their chloride conte
the results of evaporation and the chloride content, compared also to those of the previous ye
Similar results were obtained for an extended area of four new stations during the investigation
1930–31. The sources of snow and hail were also considered. Conclusions indicated by the consta
transportation of salts are that a British type of climate prevails. The estimation of transport
saline material was 25 to 30 grams per m², 70% of which is sodium chloride; relatively small
quantities of chlorides resulted from snow and hail, rarely reaching 50–60 milligrams per liter. T
presence of manganese salts was similar to that in the hailstorms of other coasts of the Atlant
although its volume could not be verified from the scarce observations. *Subject Headings:* **1. Chem**
cal composition of rainwater 2. Brest, France 3. North Finistère, France.—*O.T.*

12G–104 551.577.13:546.17:631.4

*Finnell, H. H. and Houghton, H. W., **Soil nitrogen income from rainwater.** *Oklahoma. Pan-* *ndle Agricultural Experiment Station, Panhandle Bulletin,* 23:7–24, **1931.** 6 figs., 7 tables, 11 refs. **A** (100 Ok42)—Variations of nitrogen contained in rain water, as indicated by observations in all rts of the world, reveal the effect of differing atmospheric conditions. Only few attempts to timate the agricultural value of nitrogen accumulation were made. Two series of observations ere made at the Oklahoma Panhandle Experiment Station at different times (1925 and 1929–30) nd their results are presented. Descriptions are included indicating the methods used in studying ecific local and meteorological conditions. An evaluation is given of the results pertaining to the tensity of electrical discharge and the presence of dust before rain. The data are presented in bles and diagrams. The main conclusions derived from those data indicate: 1) a lower amount of trate nitrogen at Goodwell, Okla., than at many other places; 2) the nitrate income varies with the umber of rains and the intensity of accompanying electrical discharge; 3) dust showed no effect on e average nitrate nitrogen deposition; 4) dust storms preceding rain markedly increased the nmonia content. *Subject Headings:* **1. Nitrogen in soils 2. Nitrogen in rainwater 3. Goodwell, kla.**—*O.T.*

12G–105 551.574.42:546.13

Lauscher, Friedrich and Schwarz, Karl, **Über den Chlorgehalt des Nebelfrostes auf dem Sonn- ick.** [On chlorine content in rime on the Sonnblick.] *Sonnblick Verein, Jahresberichte,* 50:32–34, **)31.** table. **DWB**—Results of special observations made during Aug. 1930–Sept. 1931. In 15 ses of hard and soft rime, observed in this period at 3106 m above sea level, the following content chlorine was found: mean—0.211 mg/l, maximum—0.421 and minimum—0.0353. Chlorine ntent decreases during northern winds and increases during southern winds. (*Same item as* –91, Oct. 1952, *Met. Abs.*) *Subject Headings:* **1. Rime composition 2. Wind effects 3. Chlorinity rime 4. Austrian Alps.**—*N.T.Zikeev.*

1932

12G–106 551.577.13:551.510.41

*Collison, R. C. and Mensching, J. E., **Lysimeter investigations, Pt. 2, Composition of rainwater Geneva, N. Y., for a 10-year period.** *N. Y. (State). Agricultural Experiment Station, Geneva, echnical Bulletin,* No. 193, March **1932.** 19 p. 6 tables, 13 refs. **DLC** (S95.E23)—Chemical mposition of rain and snow at Geneva, N. Y. is reported for 10 years from Dec. 1, 1918 to Nov. 30,)28 as NH_3—N, NO_3—N, total—N, and percentage of total—N as NH_3. Sulfur in precipitation is ported for each year 1919–1928 and by months for 1923–1928 in ppm and pounds per acre; chlorine d HCO_3 are reported for each year and by months for 1927 and 1928. An average of 7 pounds of ced N per acre per year was found at Geneva. Over 86% was NH_3. Over 41 pounds of sulphur d 16 pounds of Cl were found per acre. HCO_3 varied from 12–92 pounds per acre per year. All nstituents vary considerably from year to year. Rain was collected in an 8″ copper gage 3 ft above ound at a place 1½ mi from the center of Geneva (pop. 15,000), a town with only a few factories; a anch railroad passed 600–700 ft from station. Analysis was made once a month. Annual amounts d not differ much from sum of monthly collection analyses. Sulfur is appreciable but N and Cl are t large in comparison with demands. *Subject Headings:* **1. Chemical analysis of rainwater 2. N, Cl d sulfur in rainwater 3. Geneva, N. Y.**—*M.R.*

12G–107 551.577.13:547.281.1

Dhar, N. R. and Ram, Atma, **Formaldehyde in rain water.** *Nature,* London, 130(3278): 3–314, Aug. 27, **1932.** 17 refs. **DLC**—Report of an analysis of numerous samples of freshly llected rain water obtained at Allahabad (alt. 5500 ft) and a village about 300 mi from Allahabad to st the occurrence of formaldehyde in rain water. In all cases immediate and definite evidence was und of the existence of formaldehyde in both distilled and undistilled rain water. It is concluded at formaldehyde is actually present in rain water collected in these places and that it is washed down om the atmosphere. *Subject Headings:* **1. Formaldehyde in rainwater 2. Allahabad, India.**—*I.S.*

12G–108 551.577.13:546.17

Finnell, H. H. and Houghton, H. W., **Nitrogen content of rainwater, 1931 Oklahoma.** *Pan-* *ndle Agricultural Experiment Station, Panhandle Bulletin,* 34:3–8, **1932.** 3 tables. **DA** (100 OK42) The total nitrogen contained in the 15.45 in. of rainfall at Goodwell, Okla., for the year 1931 was timated at 1.42 pounds per acre. Of the total amount found 23.32% was in the form of nitrates, 35% was in the form of nitrites, and 69.82% was in the form of ammonia. Nitrites were more than n times as plentiful during the cooler season of the year than during the warmer. Nitrate content the rainwater appeared to be affected largely by the severity of electrical discharge previous to or companying the rain. *Subject Headings:* **1. Nitrogen in rainwater 2. Goodwell, Okla.**—*E.Z.S.*

12G–109 551.,

Priebsch, J. A., **Über die Radioaktivität der atmosphärischen Niederschläge.** [Radioact of atmospheric precipitation.] *Beiträge zur Geophysik*, Leipzig, 36:304–318, **1932.** 4 figs., 4 ta 17 refs., 3 eqs. English summary. **DLC**—The presence of radioactive substances in rain and was observed in 33 cases in 1931 in 3 Austrian localities. The emanation products were filtered the filters were investigated in a α-ray electroscope. The decay curves showed the presence o and Th products. The amount of Ra emanation as mother substance was determined from activity of the Ra products, and the "specific activity" (ratio of amount of Ra emanation to ra meltwater volume) was calculated. The values obtained for snow averaged 80 Eman (10^{-10} Cur as compared to 50 Eman for rain. *Subject Headings:* **1. Radioactive precipitation 2. Au** —*SIPRE.*

1933

12G–110 551.577.13:546.13 551.577.13:54

Collins, W. D. and Williams K. T., **Chloride and sulfate in rain water.** *Industrial and Engi ing Chemistry*, Wash., D. C., 25(8):944–945, Aug. **1933.** table, 7 refs. **DLC**—Several publi analyses of rainwater for chloride and sulfate are cited. Specific mention is made of over hundred samples of rainwater from several different places in the United States examined during two years, 1931–1932, by the Geological Survey for chloride and sulfate. The results of the diff surveys which are tabulated suggest that the greater part of the water being carried to the ocean the U. S. contains less than 0.3 ppm of chloride and not more than 2 ppm of sulfate when it rea the surface of the earth as rain or snow. *Subject Headings:* **1. Chloride in rainwater 2. Sulfa rainwater 3. United States.**—*I.S.*

12G–111 551.578.11:551.51

Das, Ananda Kishore; Sen, Gopal Chandra and Pal, Chandra Kumar, **The composition o rain water of Sylhet.** *Indian Journal of Agricultural Science*, Delhi, 3(2):353–359, April 1 3 tables, 4 refs. **DLC**—A discussion of the dissolved constituents of the rainwater of Sylhet (N. 25, E. long. 92), about 175 mi from the Bay of Bengal. In the year under review the rainfall 155 in. and it brought down 9.290 lbs nitrogen per acre. The ratio of nitrogen as ammonia, nit and nitrite is tabulated. A comparison shows that the total nitrogen at Sylhet was consider higher than in two other Indian stations and also at Rothamsted. The sources of ammoni Sylhet are believed to be (a) the sea, (b) the soil and (c) city-pollution. *Subject Headings:* **1. Che cal composition of rainwater 2. Sylhet, Pakistan.**—*I.S.*

12G–112 551.574.41:547.2

Dhar, N. R. and Ram, Atma (*both, Univ. of Allahabad, India*), **Presence of formaldehyd dew.** *Nature*, London, 131(3318):800, June 3, **1933.** **DLC**—A brief note reporting the presenc formaldehyde in dew. SCHRYVER's test showed that in all the ten samples of dew collecte Allahabad formaldehyde was present. In most of the samples of dew analyzed the amoun formaldehyde was approximately 0.0015 gm per liter. The likely origin of formaldehyde in de briefly discussed. *Subject Headings:* **1. Formaldehyde in dew 2. Origin of formaldehyde in 3. Allahabad, India.**—*I.S.*

12G–113 551.577.13:54

Dhar, N. R. and Ram, Atma, **Variation in the amounts of ammoniacal and nitric nitrogen in water at different countries and the origin of nitric nitrogen in the atmosphere.** *Indian Chem Society, Calcutta, Journal*, 10(3):125–133, **1933.** 3 tables, refs. **DLC**—This paper, which discu the variation of nitrogen in rainwater, first reports the results of an analysis made of rainwate Allahabad for ammonia nitrogen and nitric nitrogen. The values obtained are then compared w those in other countries. This comparison shows that the ratio of nitric to ammonia nitrogen as as the total nitrogen which falls with rainwater on the surface of the earth are greater in trop countries than in nontropical countries. The origin of nitric nitrogen in the atmosphere is discussed. *Subject Headings:* **1. Nitrogen in rainwater 2. Nitric nitrogen source.**—*I.S.*

1934

12G–114 551.577.13:546.39 551.577.13:546.

Braadlie, O., **Innholdet av ammoniakk og nitratkvelstoff i nedboren ved Trondheim 19** [Content of ammonia and nitrate nitrogen in the precipitation at Trondheim 1932.] *Nor Videnskabers Selskabs, Forhandlinger*, 6(14):50–53, **1934.** table, 12 refs. **DLC**—Since the 1928 investigation showed lower content at Trondheim than elsewhere, the purpose of the present inve gation was to reevaluate the results. Again the results showed lower values when compared w ata from the continent and from overseas. The total NH_3N was 115.180 g/da and NO_3N—23.811 /da at Voll Experimental Farm; at the meteorological station Holtalen, NH_3N was 60.972 and NO_3N vas 18.546. Wind directions, ground conditions, and topography are factors contributing to the ow chemical content of precipitation. *Subject Headings:* **1. Ammonia in precipitation 2. Nitrate itrogen in precipitation 3. Trondheim, Norway.**—*W.N.*

1935

12G–115 551.510.41:551.578.11:546.11.02.2

Christiansen, W. N.; Crabtree, R. W. and Laby, T. H., **Density of light water: ratio of deuterium o hydrogen in rain-water.** *Nature*, London, 135(3421):870, May 25, **1935.** **DLC**—Report of an xperiment to measure relative density and the ratio of deuterium to hydrogen in rainwater. The rocess involved the preparation of light water by electrolyzing natural water three times. The bservations indicate a difference in density at 27°C between the third stage water and rainwater of 27 in 107, and imply that there is one volume of deuterium oxide to 8500 volumes of hydrogen xide in rainwater. *Subject Headings:* **1. Chemical composition of rainwater 2. Deuterium in ainwater.**—*I.S.*

12G–116 551.577.13:551.510.41

Krehl, Willard and Knight, Nicholas, **Analyses of rains and snows at Mount Vernon, Iowa, 934–1935.** *Monthly Weather Review*, Wash., D. C., 63(5):162–163, May **1935.** Also: Knight, icholas; **Analysis . . . 1935–1936.** *Ibid.*, 64(7):231, July **1936.** And his **Analyses . . . 1936–937.** *Ibid.*, 65(7):270–271, July **1937.** tables. And his **Analyses . . . 1937–1938.** *Ibid.*, 66(7): 13, July **1938.** **DWB, DLC**—Tables give amount of precipitation (rain and snow), Cl, free NH_3, lb. NH_3, NO_3—N, and SO_3 in parts per million and in pounds per acre for 40 samples of rain and now at Mt. Vernon, Iowa under conditions similar to those for past 25 years. High values of Cl 7 ppm) were measured on Nov. 28, 1934 after wind had been in the east for several days. High alues of SO_3 were noted during cold spell when coal burning was at a maximum. (51 samples were nalyzed in 1935–36, 42 in 1936–37, and 55 in 1937–38; the last year this work was carried out at ornell College, Mt. Vernon, Iowa). *Subject Headings:* **1. Chemical composition of rainwater . Seasonal distribution 3. Weather influences 4. Mt. Vernon, Iowa.**—*M.R.*

12G–117 551.574.41 551.578.11

†*Lansberg, Thusnelda, **Quantitative Untersuchungen über die kutikuläre Exkretion des Laub- lattes.** [Quantitative investigations on cuticular excretion of foliage.] *Jahrbücher für Wissen- chaftliche Botanik*, Berlin, 81(5):769–806, May **1935.** 5 figs., 11 tables, 30 refs. **DA**—A study on he variation of the amount of salt deposited on the surface of foliage by rain, dew and fog. (*Same em as* 3D–137, April 1952, *Met. Abs.*) *Subject Headings:* **1. Dew analysis 2. Precipitation analysis . Germany.**—*N. T. Ziekeev.*

1936

12G–118 551.510.41:551.578.11

Robinson, W. O., **Composition and origin of dust in the fall of brown snow.** *Monthly Weather eview*, Wash., D. C., 64:86, **1936.** 2 tables, ref. **DLC** (QC983.A2)—During the night of Feb. 24 nd early morning of Feb. 25, 1936, rain, sleet, and snow fell over the region of New Hampshire, ermont, and northern New York, and at many localities the precipitation was strongly colored rown by admixed dust particles. Several samples were analyzed. Mineral analysis makes it lmost certain that the dust deposited in the storm originated no farther east than the Missouri iver. *Subject Headings:* **1. Chemical composition of rainwater 2. Dust in rainwater 3. New ampshire 4. Vermont 5. New York.**—*E.Z.S.*

1937

12G–119 551.510.41:551.578.41:551.574.42

Kohler; Hilding, **Studien über Nebelfrost und Schneebildung, und uber Chlorgehalt des Nebel- rostes des Schnees und des Seewassers im Halddegebiet.** [Study on rime and snow formation nd on chloride content in rime, snow and sea water in the Haldde region.] *Uppsala. Universitet. ineralogisk-Geologiska Institut, Bulletin*, 26:279–308, June 28, **1937.** 10 figs., 7 tables, 10 refs. **LC**—A comprehensive study of the structure and chemical composition of rime and snow. The uthor also investigates frequency and intensity of rime. These observations were carried out at aldde Observatory (904 m) for many years. It was concluded that the thickness of rime depended n height above surface. The increase of thickness with height can be computed by the following rmula: $M = 0.000809Z^2 + 0.004422 + 0.889$ (Z in m). (*Same item as* 3J–124, Oct. 1952, *Met. Abs.*)

Subject Headings: **1. Chemical composition of rime and snow 2. Rime analysis 3. Haldde, Swe** —*N. T. Ziekeev.*

12G–120 546.33:551.57

Teakle, L. J. H., **Salt content of rain water.** *Western Australia. Dept. of Agriculture, Jou* 14:115–123, **1937.** 5 tables, 8 refs. **DA** (23 W52j)—Analysis of rainwater shows that it invari contains impurities of which, in non-industrial centers, chlorides (principally NaCl) are the important constituents. In coastal areas the mean salt content of rainwater may be expecte range from 15 to 50 ppm and in inland areas from 5 to 20 ppm. The annual precipitation of sa rainwater generally ranges from 100 to 600 pounds per acre in coastal regions and from 10 t pounds per acre in inland centers. A comparison of the composition of rainwater from var parts of the world from data reported by Miller (1906) and Crowther and Ruston (1911 included. *Subject Headings:* **1. Sodium chloride in rainwater 2. Salt in rainwater.**—*E.Z.S.*

1938

12G–121 551.577.13:54

Daniel, H. A.; Elwell, H. M. and Parker, H. Y., **Nitrate nitrogen content of rain and runoff w from plots under different cropping systems on soils classified as Vernon fine sandy loam.** *Science of America, Proceedings,* 3:230–233, **1938.** 2 figs., table, 12 refs. **DA** (569 So3)—The nit nitrogen content of rain and runoff water from plots under controlled cropping systems at the Conservation Experiment Station, Guthrie, Okla., is given. There was considerable variation the quantity reported from the different treatments and during various seasons. The largest quan of nitrate nitrogen appearing in the rain water during any season was 1.530 lbs/acre, the lowest 0.403 lbs/acre, while the average was 0.976 lbs/acre. Although there was no definite relation betw the quantities of nitrate nitrogen and total rainfall, the smallest quantity of nitrate nitrogen occur during the driest year. *Subject Headings:* **1. Nitrate nitrogen in rainwater 2. Vernon fine sa loam 3. Guthrie, Okla.**—*E.Z.S.*

12G–122 551.577.13:551.510

Heller, V. G., **Chemical content of Oklahoma rainfall.** *Oklahoma. Agricultural Experim Station, Technical Bulletin,* No. 1, **1938.** 23 p. 12 refs., table. **DA** (100 OK4)—A brief review the literature on chemical content of rainfall. Data provided by previous investigators are tabula for comparison and it is concluded that: there are appreciable amounts of chemical compou deposited by annual rainfalls, the amount of "ammoniacal" nitrogen is greater during the spr months, after which it drops until early fall when it again rises, the greater percentage of chemi content is found in the limited rainfall after prolonged dry periods, after dust storms, and n industrial centers. It was observed that the nitrate nitrogen increased after electrical disturban especially during September. The nitrite nitrogen is usually small and of slight importance. T chloride content seems to be greater in the spring and fall, varying with the direction of the w and the location. The sulphates are surprisingly high and vary a great deal with location and ti of year. *Subject Headings:* **1. Chemical composition of rainwater 2. Oklahoma.**—*E.Z.S.*

12G–123 551.577.13:551.510

Leeflang, K. W. H., **De chemische samenstellung van den neerslag in Nederland.** [Chemi composition of rainwater in the Netherlands.] *Chemisch Weekblad,* Amsterdam, 35(1824):658–6 Sept. 10, **1938.** 3 figs., 2 tables, 13 refs. **DLC** (QD1.C6885)—Detailed breakdown of the chemi composition of precipitation in relation to distance from the coast is given for the periods April 2 June 21, 1935; Oct. 20–Dec. 21, 1936, and in mean values for five periods between Nov. 16, 19 through Dec. 22, 1937. Individual amounts of several constituents are presented in curves. T total annual yield of nitrogen was 2300 tons and of ammonia 12.650 tons. *Subject Headin* **1. Chemical composition of rainwater 2. Netherlands.**—*W.N.*

1939

12G–124 551.577.13:546.13 551.577.13:546.

Narayanaswami, R., **Some measurements of chloride, nitrate and nitrite present in the water the monsoon rains at Bombay.** *Indian Academy of Sciences, Proceedings, Sec. A,* 9(6):518–5 June **1939.** 2 tables, 15 refs. **DLC** (Q73.16)—The measurements of the chloride, nitrate a nitrite content of rainwater collected during the monsoon season of 1938 at the Colaba Observato Bombay, are reported and tabulated. The samples were collected at the top of one of the Observ tory towers at a height of about 70 ft above ground and 100 ft above mean sea level. The analy of these samples shows that the relative excess of nitrite during thunderstorms is greater than that nitrate. The amount of nitrogen combined as nitrite is much smaller than that as nitrate. T hloride content does not appear to be affected by thunder and lightning. Comparisons of the salt ontent of rainwater in Bombay with those observed in other countries are tabulated and the results iscussed. *Subject Headings:* **1. Chlorine in rainwater 2. Nitrogen in rainwater 3. Thunderstorm nfluences on chemical composition of rainwater 4. Bombay, India.**—*I.S.*

1940

12G–125 551.574.42:551.510.41:551.515.8:551.55(44)

Bricard, Jean, **Recherches des corps qui se trouvent dans le givre.** [Investigations of rime omposition.] *Revue Scientifique*, Paris, 78(1):35–36, Jan. **1940.** table, ref. **DLC**—Report of nvestigations made during the winter of 1938–1939 at Puy de Dôme. These observations showed he variations of contents of Cl, NO_2, NO_3 and NH_3 in rime, depending on the characteristics of air nasses and wind direction. (*Same item as* 3J–153, Oct. 1952, *Met. Abs.*) *Subject Headings:* **. Chemical composition of rime 2. Air mass characteristics 3. Wind effects 4. Puy de Dôme, 'rance.**

1941

12G–126 551.577.13:546.17

Koch, D. E. V., **Nitrogen content of Ceylon rain.** *Tropical Agriculturist (and Magazine of the 'eylon Agricultural Society)*, Peradeniya, 97:74–77, **1941.** table, 4 refs. **DA** (26 T751)—Analytical ata for the period May 1, 1940 to April 30, 1941, are given. A figure as high as 12.85 lb/acre per nnum of inorganic nitrogen has been recorded. Of this amount, nitrogen in the form of ammonia is early $7\frac{1}{2}$ lb and, therefore, is in slight excess. The ratio of NH_3N/NO_3—NO_2N is 1/0.72. The ighest amount of total nitrogen brought down occurred in the second half of March 1941, when there vas fairly heavy rainfall following a period of drought. For nearly six months of the year, viz: ugust to January, there was a preponderance of ammonia in the rain water and hence, the ratio f "ammoniacal" nitrogen to nitrate nitrite nitrogen was much above 1.5. During the months of uly 1940 and April 1941 the nitrogenous matter brought down was least. In general, when the ainfall is small the rain water contains a higher concentration of both ammonia and nitrates. *Subject 'eadings:* **1. Nitrogen in rainwater 2. Peradeniya, Ceylon.**—*E.Z.S.*

12G–127 551.577.13:546.17

Roelofsen, P. A., **Stikstof in Regenwater.** [Nitrogen in rain water.] *Natuurwetenschappelijk 'ijdschrift voor Nederlandsch Indië*, 101(6):179–180, June **1941.** table. **DLC**—The amount of itrogen in rainwater during the years 1925–1940 is discussed in relation to its agricultural significance. 'ollections were made in the Deli River region. *Subject Headings:* **1. Nitrogen in rainwater 2. Deli iver, Indonesia.**—*W.N.*

1943

12G–128 551.577.13:546.46

Betrand, Gabriel, **Sur le magnésium de l'eau de pluie récoltée à Grignon.** [Magnesium in inwater collected at Grignon.] *Académie des Sciences, Paris, Comptes Rendus*, 216(10):364–367, 1arch 15, **1943.** **DLC**—In continuation of experiments started in 1935, various precautions were ıken against external effects on the experimental test-tubes. The discovery of perceptible quantities f magnesium in the water after another series of experiments was noted. The source of the magesium was considered. Some might have come from the dissolving activity of water over terrestrial ust which falls daily on the test-tubes. The end-result of the analytical experiments, however, roved that the rain at Grignon contained small quantities of dissolved magnesium which did not ome from terrestrial dust deposited on the test-tubes. *Subject Headings:* **1. Magnesium in rainater 2. Grignon, France.**—*O.T.*

12G–129 551.577.13:546.46 551.577.13:546.41

Bertrand, Gabriel, **Sur le magnésium et le calcium de l'eau de pluie récoltée à Paris.** [Magesium and calcium in rainwater in Paris.] *Académie des Sciences, Paris, Comptes Rendus*, 216:701–04; May 31, **1943.** 2 tables, 4 refs. **DLC** (Q46.A14)—The results of analysis of rainwater collected the top of the Institute Pasteur in Paris, during successive four quarters are presented. The latively higher altitude compared with the results of previous but similar analysis at Grignon at ırface level together with a new method in order to eliminate infiltration of terrestrial dust particles, ere responsible for the relatively more correct determination of the liquids and deposited mineral ontents. The recovery of calcium and magnesium of micro-organic origin showed reduced imortance. The magnesium and other elements of the filtered liquids originated only very partially om the dissolution of mineral substances of deposits. Coal-ash is generally poor in calcium and agnesium. The existence of a certain quantity of dissolved salts, especially of magnesium is proved Paris as well as in the country (Grignon). The tables contain the quarterly and annual quantities of liquids and deposited minerals, collected under different conditions in the Institute Pas *Subject Headings:* **1. Magnesium in rainwater 2. Calcium in rainwater 3. Paris, Fr 4. Grignon, France.**—*O.T.*

12G–130 551.577.13:54

Harper, Horace J., **Sulhur content of Oklahoma rain.** *Oklahoma Academy of Science, Proceed* 23:73–82, **1943.** 4 tables, 18 refs. **DA** (500 OK42)—The sulphur content of rainfall at Stillwa Okla. was studied for 15 years from 1927 to 1942. The largest quantity of sulphur in the rain occu during October, November and December. The largest quantity of total sulphur was obta during April, May and June which is the period of highest precipitation in this region. The ave quantity of sulphur in the annual rainfall was 8.73 pounds per acre with a maximum of 12.68 a minimum of 6.17 in 1933 and 1934, respectively. The average sulphur content per acre inch of was similar to that obtained in other areas of limited industrial development. The sulphur con of rainfall collected for six years, 5 mi south of Guthrie, Okla., and for two years near Lone Gr Okla., was similar to the results obtained at Stillwater, Okla. Sulphur data on rainfall at Good Okla. were lower than at Stillwater, although the concentration of sulphur in the rain falling in area was nearly twice as high. Seventeen pounds of sulfur per acre was present in 32 in. of rai collected at Heavener, Okla. in 1934. *Subject Headings:* **1. Sulphur in rainwater 2. Seas distribution of sulphur in rainwater 3. Oklahoma.**—*Author's abstract.*

12G–131 551.578.11:54

Koch, D. E. V., **The nitrogen content of Ceylon rain.** *Tropical Agriculturist (and Magazin the Ceylon Agricultural Society)*, Peradeniya, 99:18019, **1943.** table. **DA** (26 T751)—The amo of inorganic nitrogen brought down annually at Peradeniya may be assumed to be about 10 lbs f rainfall of 100 in. approximately. There appears to be a preponderance of ammonia in the nitr enous constituents of rain water and this is especially observed for rain falling during the six mon of the year Aug. 1 to Jan. 31. In general heavy rainfalls bring down more nitrogenous matter t light showers and that in spite of the fact that the concentration of the nitrogenous constituent lower in the former. The relatively high ratio of nitrogen in the form of ammonia to nitroger nitrate-nitrite, for the halfyear beginning in Aug., appears to be seasonal and the results obtai previously, point to this view. *Subject Headings:* **1. Nitrogen in rainwater 2. Peradeniya, Cey** —*Author's abstract.*

12G–132 551.578.11:541.1

Otsuki, Torao and Takahashi, Sei, **Acidity of snow.** *Kagaku (Chemistry)*, Tokyo, 13(6):2 June **1943.** tables. In Japanese.—During Jan. of 1943 at Mt. Happo in Nagano Prefecture, authors investigated the acidity in snow layers and compared its value to artificial ice and natu ice and frost that had been obtained in Niigata and Nagaoka cities. Rate of variation of aci at the snow depth of 1.5 m and 2 m was found to be different, but pH after several hours of boil the snow was not found to vary. It was assumed that the saturation of CO_2 would be increase lower temperature. The different ratio of acidity found in the snowfall is explained by the eff of materials contributed by trees and plants. *Subject Headings:* **1. pH of rainwater 2. pH of sn 3. Japan.**—*K.C.*

1944

12G–133 546.46:551.577

Bertrand, Gabriel, **Origine multiple du magnésium de l'eau de pluie.** [Multiple origin magnesium in rainwater.] *Académie des Sciences, Paris, Comptes Rendus*, 219(1):14–16, July **1944.** **DLC**—Continuing the experiments of several years on the origin of magnesium in ra various products were examined in the region of Paris-Grignon. They included the Mg/Ca in ra water and in limestone rocks. Comparison proved that more magnesium was present in meteo water than in limestone rocks. The high insolubility of Mg/Ca compounds led to the considerat of other sources than that of terrestrial dusts. They originate probably from highly elevated s droplets transported by winds touching the waves during high tides. These droplets are maintai for a long period in the atmosphere and transported long distances like others of small dimensi They reach the Paris region in remarkable quantity. *Subject Headings:* **1. Magnesium in rainwa 2. Origin of magnesium in rain 3. France.**—*O.T.*

1947

12G–134 551.577.13:546.46 551.577.13:546.

Bertrand, G., **Démonstration biologique de la présence du magnésium et du potassium da l'eau de pluie.** [Biological demonstration of the existence of magnesium and potassium in ra water.] *Paris. Institut Pasteur, Annales*, 73:1186–1190, **1947.** 2 tables. **DA** (448.3 An75)

Experiments are described about the biological effects of the suggested presence of magnesium and potassium in rain water. The series of experiences on the development of algae showed in the first stages a degeneration of the algae culture caused possibly by some antibiotic poisoning. A very precise, and long lasting analysis proved the presence of magnesium and potassium salts in rain water. One of the tables shows identical quantities of deposits in the containers of rain water, distilled water and ash solution with those in cultures directly observed. The quantity of residue in ash, SiO_2, aluminum and ferrous-oxides, calcium, manganese and potassium, obtained by evaporation, are shows in another table. *Subject Headings:* **1. Magnesium in rainwater 2. Potassium in rainwater 3. France.**—*O.T.*

12G–135 551.577.13:546.22

Fried, M. J. and Jackson, M. L. **Sulfur collection in precipitation by means of all-weather non-corrosive rain and snow gauge.** *Science*, Wash., D. C., 106:19–20, **1947.** 2 figs. **DLC** (Q1.S35)—To measure sulphur brought to the soil in rain and snow, a special rain gage has been designed at Purdue University Agricultural Experiment Station, Lafayette, Ind. The rain gage is described and a schematic drawing and photograph are shown. Recommendations for the best rain collecting sites are given. *Subject Headings:* **1. Sulphur in precipitation 2. Lafayette, Ind.**—*E.Z.S.*

1948

12G–136 551.577.13:546.17 631.41:546.17

Kudrin, S. A., **O postuplenii azota s atmosfernymi osadkami v pochvy serozemnoizony.** [The nitration of gray desert soil by precipitation.] *Pochvovedenie*, Moscow, 43:608–611, **1948.** tables, 6 refs. **DLC**—Chemical analysis of rain and snow was made during 1945–1947 at the Akkavak experimental station near Tashkent. The average annual amount of NH_3 in snow and rain attained 0.6 mg/l and of HNO_3 0.07–0.08 mg/l. The maximum HNO_3 content was observed during May–July in thunderstorm rain, and the minimum in winter precipitation. The NH_3 content varied inversely with the precipitation intensity. The high NH_3 percentage (up to 90% of all N received) is probably a peculiarity of the interior of continents, since precipitation in littoral zones produced only 65–75% NH_3, and in tropical areas about 30–50%. *Subject Headings:* **1. Chemical composition of rain and snow 2. Tashkent, U.S.S.R.**—*SIPRE.*

12G–137 551.575.1:551.510.41

*Matsui, H., **Chemical studies of condensation and sublimation nuclei, Pt. 2, Chemical studies on the fogs at Hitoyoshi, Kumamoto Prefecture,** *Meteorological Society of Japan, Tokyo, Journal Ser. 2,* 26(2):169–171, May **1948.** 5 tables. In Japanese. **DLC**—The investigation was carried out for the purpose of analyzing the condensation nuclei that are essential to the formation of fog The period covered three days (Nov. 23–25, 1943) and water collection was carried out on a tree at a height of 6 m and also at 10 m. The chemical composition of fog water at Hitoyoshi, Kumamoto Prefecture is as follows:

SiO_2	Al_2O_3	Fe_2O_3	Cl	SO_4	NO_3	Ca	Mg	Na	K	NH_4	Total $mg.l^{-1}$
1.38	0.5	1.06	8.16	225.00			0.30				339.29

In conclusion the author proved that condensation nuclei are mainly composed of combustion products from coal (sulphuric acid, ammonia, coal ashes, etc.) or of sea salt particles dispersed in the atmosphere ($CaSO_4$ Na_2SO_4 NaCl, etc.). *Subject Headings:* **1. Chemical composition of fog 2. Kumamoto Prefecture, Japan.**—*K.C.*

12G–138 551.577.13:546.13

*†Menzl, O., **Über den Chlorgehalt der Niederschläge.** [Chlorine content of precipitation.] *Zeitschrift für Meteorologie,* 2:289–295, Oct. **1948.** fig., 10 tables. 22 refs. **DWB, DLC**—Chlorine content determinations of rain and melted snow were made on the Donnersberg (Czechoslovakia), surrounded by industrial plants, and at Haid (Czechoslovakia) an agricultural region. The mean Cl-content of melted snow on the Donnersberg was 8.12 mg/l with a maximum of 30.97 mg/l and a minimum of 1.59 mg/l. The corresponding values for Haid were 5.90, 25.90, and 1.93 mg/l. An analysis is made of these and previous determinations by other investigators. Chlorine concentration increases with elevation up to the lower condensation level and then decreases. The Cl content of precipitation is dependent on the form of precipitation (rain, hail, snow) and on the type, the concentration being greater in squalls. The magnitude of Cl content is shown to vary locally. *Subject Headings:* **1. Chlorine in precipitation 2. Donnersberg, Czechoslovakia.**—*SIPRE.*

12G–139 551.577.13:541

*Sugahara, Ken (*Dept. of Science, Nagoya Univ.*), **Chemistry of precipitation.** *Kagaku (Chemistry)*, Tokyo, 18(11):485–492, Nov. **1948.** 3 figs., 11 tables, 16 refs. In Japanese. **DLC**—This paper presents the historical development of precipitation chemistry in Japan and in western countri The main problems discussed are the necessity of research and its application, its practical purpos meteorological progress; chemical composition of rain, snow, sleet, typhoon and sea wind; the relati between soluble and insoluble elements with regard to wind-salt and dust in sea-salt, and precipitati and washing processes as well as theories on rain and snow formation. Data (without dates collection) are for the following: composition of rain at Nagoya City; comparative amounts of nit gen in Tokyo, in Rothamsted, England and Mississippi; content of rain at various regions in Japa comparative ratio of Cl in rain and washing process in various regions and Cl content in ordinary ra fog-ice at the top of Mt Fuji, and thunderstorms. *Subject Headings:* **1. Chemistry of precipitati 2. Japan.**—*K.C.*

1949

12G–140 **551.574.1:551.577.13:551.510**

†Cauer, H., **Ergebnisse chemisch-meteorologischer Forschung.** [Findings of Chemical-meteo logical research.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 1(3/ 221–256, **1949.** 62 refs. **DLC** (QC851.A732)—Based on numerous measurements and investi tions in various places of Europe, the amount, origin, distribution and circulation of various co stituents of rainwater under influence of light and ozone are treated. These investigations show typical connection between humidity and ozone as observed at Obers-Schreiberhau. A theory whi shows the combination of the medium values and variations of different chemical substances reviewed. New investigations on the chemical separation of droplets through disruption are ill trated by quotient-value, and the salt concentration of samples of hydrated dissolutions are give The connection between the electric charge of the droplet nuclei and the corresponding physi processes (Lenard effect) is discussed. The results of observations of diurnal distribution of ammon and nitrite are discussed. A theory of the chemical, electrostatic and electromagnetic causes condensation is developed. Reference is made to the possible biological significance of the molecu contact forces which release condensation. *Subject Headings:* **1. Chemical composition of rainwat 2. Europe.**—*O.T.*

12G–141 551.577.13:519.

Egner, Hans; Eriksson, Erik and Emanuelsson, Arne, **Composition of atmospheric precipitati Pt. 1, Sampling technique** [and] **use of ion exchange resins.** *Uppsala.* (*K*) *Lantbrukshogskolan Annaler*, 16:593–602, **1949.** 4 figs., 10 refs. **DLC**—In order to investigate the composition atmospheric precipitation in Sweden, a technique using ion exchange resins has been developed. T possibilities of nitrate reduction, and ammonia losses, when the precipitation is collected in zinc gag is stressed. Glass funnels are used, and they are effectively protected from bird droppings. T ion exchange resins so far available are quite serviceable but show some deficiencies as to stabilit and activity in alkaline solutions. New resins, which are not yet available, seem to offer defini advantages. (*Same item as* 6.8–286, Aug. 1955, *Met. Abs.*) *Subject Headings:* **1. Precipitati composition 2. Ion exchange resins 3. Rainwater analysis techniques 4. Sweden.**—*Author abstract.*

12G–142 551.577.13:546.2

Matsui, H., **On the content of hydrogen peroxide of atmospheric precipitates.** *Meteorologic Society of Japan, Journal, Ser. 2*, 27(12):380–381, Dec. **1949.** 2 refs. In Japanese; English summar p. 40. **DWB**—Amount of H_2O_2 in precipitation at Kanakawa varied from .08 to .86 mg/l, maximu June, minimum Jan., varying with UV radiation, and attributed to action of UV on water particle (*Same item as* 2.6–112, June 1951, *Met. Abs.*) *Subject Headings:* **1. Hydrogen peroxide in rainwat 2. Rainwater analysis 3. Snow analysis 4. Japan.**—*C.E.P.B.*

12G–143 551.578:546.21

Matsui, Hideo (*Central Met. Obs., Tokyo*), **On H_2O_2 contained in rain and snow.** *Kagak* (*Chemistry*), Tokyo, 19(12):564–565, Dec., **1949.** table, 2 refs. In Japanese. **DLC**—During th period from April to Nov. of 1948, samples were collected of 52 rainfalls and of 9 snows in order t measure the amount of H_2O_2 contained in the rain and snow of Kanakawa Prefecture in the Hakon Mountain region. The methods used were direct colorization as well as Schöne's method. Th results of the investigation are shown in tables: (1) the H_2O_2 contained in rainfall is due to the fac that the waterdrops in the atmosphere are affected by the ultraviolet rays of the sun and (2) th ratio of H_2O_2 in rainfall is higher than in snowfall, although the former differs according to the date collection. *Subject Headings:* **1. Hydrogen peroxide in rain and snow 2. Kanakawa, Japan.**—*K.C*

12G–144 551.577.13:546.1

Takeuchi, U., **Amount of chlorine contained in the precipitation at Nagano in relation to th air mass over that area.** *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 27(1):25–28, Jan

949. 4 figs., 6 tables, 7 refs. In Japanese. **DLC**—An investigation to determine the relationship etween air masses and the chloride content of rain in Nagano Prefecture was made during the period ug. 5, 1947 to Jan. 1, 1948. The air masses were grouped into four types: 1) that of the Japan Sea nd Siberia, 2) Pacific origin, 3) at the juncture of both and 4) of Siberia only. The results obtained re as follows: 1) the amount of Cl in precipitation was the least when the air mass came from the ea of Japan and 2) different amounts of Cl were found in the air mass which came from Siberia and hat which came from the Pacific. *Subject Headings:* **1. Chlorine in rainwater 2. Chlorine disribution 3. Nagano, Japan.**—*K.C.*

12G–145 551.577.13:551.577

Zanon, F. S., **Il chloruro di sodio nell 'aria al Lido di Venezia.** [Sodium chloride in the air of he Lido, Venice.] *Rivista di Ecologia*, Perugia, 1:66–80, **1949.** fig., 2 tables, 6 refs. English ummary p. 79–80. **DA** (410 R522)—After having described the apparatus for the absorption of one ubic meter of air for each test, the results of 14 analyses of the Lido (Venice) air and 9 analyses of he precipitation are related. For the chloride ion, Cl^-, intermediate values are found between those f the large salinity of the Pacific beach in California and the nearly continental and consequently cantily saline air analyzed at Pavia. *Subject Headings:* **1. Sodium chloride in precipitation 2. Caliornia 3. Venice, Italy.**—*Author's abstract.*

1950

12G–146 551.510.42:551.590(02) 551.57.13:546.33:546.13

†Baddhue, John Davis, **Meteoritic dust.** *New Mexico. University, Publications in Meteoritics* o. 2, **1950.** 102 p. photos, tables, graphs, 108 refs., eqs. Price: $1.50. **DLC**—A text dealing ith methods of collecting dust from the atmosphere. Types of particles, physical and chemical ests, total annual dustfall, dust in hail and snow, annual variation and rate of fall of meteoric dust re presented. A brief history of studies on meteoric dust since 1819 and a 6-page bibliography add to he value of the book. The author has collected meteoric dust from rainwater with magnets, on lides from dry air, and from hail or snow. Microscopic analysis as well as chemical analysis is made nd the results given in tables and illustrated by photographs. Some dust comes from interstellar pace. Rate of fall is also calculated. (*Same item as* 3.10–93, Oct. 1952, *Met. Abs.*) *Subject eadings:* **1. Meteoric dust textbooks 2. Rainfall analysis 3. Dust in hail and snow.**—*M.R.*

12G–147 551.577.13:546.22

*†Bertramson, G. R.; Fried, M. and Tisdale, S. L., **Sulfur studies of Indiana soils and crops.** *oil Science*, New Brunswick, N. J., 70:27–41, **1950.** 5 figs., 9 tables, 32 refs. **DA** (56.8 So3)— tudies on the sulphur balance of Indiana soils gave the following results. The amount of sulphur rought down in one year in the precipitation varied between 20 and 127 lbs/acre with an average of bout 27 lbs when the figure for Gary and industrial areas is omitted. *Subject Headings:* **1. Sulphur n precipitation 2. Gary, Ind.**—*E.Z.S.*

12G–148 551.577.13:546.17

*Ingham, G. (*Pretoria, South Africa*), **The mineral content of air and rain and its importance to griculture.** *Journal of Agricultural Science*, Cambridge, 40:55–61, **1950.** 6 tables, 18 refs. **DLC** S3.J84)—The author notes that Liebig (1847) believed that the nitrogen in soils was derived from he small amount of ammonia in air and rain. Much evidence in support of this was accumulated n the latter half of the nineteenth century but largely abandoned when microbiology came into being. ain water collection and testing made by the author, by the method adopted by Hall and Miller 1911) are described. In a rainfall of 30 in. combined nitrogen will generally amount to 4 or 5 b/acre/annum but in Ceylon in a rainfall of 100 in. it may be as much as 13 lb/acre. The total ineral matter contained in rain is distinguished from that which might have been washed out from eaves. *Subject Headings:* **1. Nitrogen in rainwater 2. Origin of nitrogen in rain 3. Ceylon.**—*E.Z.S.*

12G–149 551.577.13:546.132

Miyake, Y. and Sugiura, Y., **The mechanism of dissolution of the atmospheric chloride into rain ater.** *Papers in Meteorology and Geophysics*, Tokyo, 1(2–4):222–226, Dec. **1950.** 4 figs., 5 refs., 1 eqs. **DWB**—Capture of salt particles by collision with falling raindrops results in progressive iminution of salt content of rain. This was calculated and agreed with observation. A relation was ound between total precipitation P and chlorinity C roughly in the form $CP = a$ constant which epends on local conditions. Radius of salt particles calculated as 0.8×10^{-4} cm. (*Same item as* .10–147, Oct. 1951, *Met. Abs.*) *Subject Headings:* **1. Rainwater analysis 2. Chloride in rainwater.** —*C.E.P.B.*

12G–150 551.577.13:546

Miyake, Yasuo and Sugiura, Yoshio (*Met. Inst., Tokyo*), **Some problems on precipita chemistry.** *Kagaku (Chemistry)*, Tokyo, 20(8):379–380, Aug. **1950.** 2 figs., 7 refs. In Japan **DLC**—The amount of SO_4 in rainfall is relatively higher than the amount of sea-salt. The aut discussed the method of experimentation and the calculations using an example of a typhoon (w occurred on Sept. 1, 1949). The relationships between the amount of rainfall and of Cl, the den of Cl in precipitation and in Bai-u, and SO_4/Cl in rain accompanied by typhoon (Fig. 2) are poi out. Concerning the different ratio between SO_4 and Cl, the tentative conclusions were: 1) C rainfall is affected by salt particles in the atmosphere; 2) when the particles in sea water star evaporate, SO_4 starts to crystallize speedily and precipitates, conversely, Cl turns into micro-w drops at 70% of humidity and falls to the earth's surface. *Subject Headings:* **1. Sulphate in rainw 2. Rainfall analysis techniques 3. Chlorine in rainwater 4. Weather influences on compositio rainfall.**—*K.C.*

12G–151 551.510.41:551.578.11:546.

Miyake, Yasuo and Sugiura, Yoshio, **A study on nitrogen compounds in the atmosphere.** (*physical Magazine*, Tokyo, 22(1):1–4, Oct. **1950.** 3 figs., 3 tables, 7 refs. **DWB**—The amoun ammonia, nitrate and nitrite in the air varies from season to season and the same is true of amount in rainwater. In the latter case the amount varies with the amount of rainfall, as is sh by graphs. The authors made analyses in Tokyo from Feb. to Dec. 1948, and present briefly results and conclusions. (*Same item as* 2.4–48, April 1951, *Met. Abs.*) *Subject Headings:* **1. Atm pheric composition 2. Ammonia in rainwater 3. Rainwater analysis 4. Tokyo, Japan.**—*M.R.*

12G–152 551.578.11:54

Ricard, Y., **Recherche polarographique d'alcalins dans l'eau de pluie.** [Polarographic resea on alkalinity of rainwater.] *Journal Scientifique de la Météorologie*, Paris, 2(6):50–55, April/J **1950.** 7 figs., 2 refs., equation. Summaries in French, English and Spanish p. 50. **DWB**– method is described and the equipment illustrated for testing the amount of sodium and potassi in rainwater when the concentration of salts are very dilute. An amount of alkaline electrolyte to 100 times as great as that in the sample, is introduced into the solution in order to suppress "current migration" so that only the "diffusion current" is registered in the polarigraph. The us method shows a combination of the two currents and does not give the true analysis. *Sub Headings:* **1. Rainwater analysis 2. Salinity determination 3. Sodium in rainwater 4. Potassi in rainwater.**—*M.R.*

12G–153 551.578.11:546

Shinkai, K., **On the time variation of the amount of nitrogen compounds in thundershower a their causes of formation.** *Meteorological Society of Japan, Journal*, Ser. 2, 28(5):177–180, May 19 3 figs., 5 tables. In Japanese; English summary p. 180. **DWB**—Author measured NO_2, NO_3, and N in rain. The first two increase rapidly after violent thunder and are regarded as products of the d charge. Ammonia increases less rapidly and soon becomes constant, decreasing again to alm zero in 3 hours. Ammonia is attributed to human activity. (*Same item as* 2.3–133, March 19 *Met. Abs.*) *Subject Headings:* **1. Rain composition 2. Nitrogen in rainwater.**—*C.E.P.B.*

12G–154 551.577.13:0

†U. S. Air Weather Service, **Bibliography on chemical composition of precipitation and on so impurities in precipitation.** Its *Air Weather Service Bibliography*, No. 2, **1950.** 14 p. 55 re (unannotated). **DWB** (M(016) U58bi)—A bibliography citing 55 references in several languag *Subject Heading:* **1. Bibliography of precipitation chemistry.**—*E.Z.S.*

1951

12G–155 551.577.13:541.123.3:551.515

Barla, Mario, **La concentrazione idrogenionica delle acque di precipitazione atmosferica relazione ai diversi sistemi frontali.** [The pH concentration in precipitation water in relation various frontal systems.] *Rivista di Meteorologia Aeronautica*, Rome, 11(3/4):38–40, July/Dec. 195 Italian, French, English and German summaries p. 38. **DLC**—Measurements were made from Ju 1949 to July 1951 with a sensitive electrometer with an accuracy of .01 pH. The precipitation w classified according to 3 types: 1. warm front (snow and rain), 2. cold front with warm air (a) along the front and (storm and snow) (b) in forward portion only (rain or snow, drizzle and storm and 3. occlusion type. In all, 48 determinations were made at beginning and end of rain in each cas The pH was always lower at the end of the rain than at the beginning. (*Same item as* 4.3–21 March 1953, *Met. Abs.*) *Subject Headings:* **1. Precipitation analysis 2. Frontal precipitati 3. pH of rainwater.**—*M.R.*

12G–156 551.577.13:541.123.3 **551.578.4**

Comissot, N. A., **The pH of the rain at Beirut and of the snow on the mountains of Lebanon.** *American Meteorological Society, Bulletin,* 32(1):24–26, Jan. **1951.** 4 tables, ref. **DWB**—Electrometrical measurements of the pH of various forms of precipitation were made at Beirut during the rainy season of 1937–1938 and 1938–1939 in order to study the composition and pollution of the atmosphere at the time precipitation is formed. Tables give the frequency distribution of pH and the mean values of pH for the period of investigation. Seasonal variation of the acidity of rain is shown by the data. It is suggested that this investigation might aid study of the formation of cyclonic and anticyclonic systems. (*Same item as* 2E–212, May 1951, *Met. Abs.*) *Subject Headings:* **1. Rain composition 2. pH of rainwater 3. Rainwater analysis 4. Beirut, Lebanon.**—*M.L.R.*

12G–157 551.578.41:553.631

*Endo, Juitsu and Mashima, Michio, **The contents of salts in falling snow, Pt. 1.** *Studies in Fallen Snow,* Nagaoka, Japan, 3:53–69, **1951.** 3 tables, 5 refs. In Japanese; English summary p. 69. **Pt. 2,** *Ibid.,* 4:33–49, **1952.** 2 tables, ref. In Japanese. **Pt. 3,** *Ibid.,* 4:51–58, **1952.** 8 figs., 7 tables, 7 refs. In Japanese. **Pt. 4,** *Ibid.,* 5:71–81, **1955.** 6 figs., 7 tables, 4 refs. In Japanese. **DLC** (Orientalia)—During the period from Nov. 30, 1950 to March 30, 1951, chemical analyses of falling snow were made at the Faculty of Engineering, Niigata Univ., Nagaoka, for Cl^- (318 samples), SO_4^{--} (50), Ca^{++} (26), K^+ (15) and Na^+ (15). Analytical methods used to determine the amount of Cl^-, HCl (50–100 cc), Ca and Mg (3–10 l), Na and K (4–10 l) are given in discussion; tables include the amount of Cl (mg/l) at a given time and date, the amount of rainfall (mm/h) and weather conditions. Pt. 2 presents the results of chemical analyses made during the period from Nov. 27, 1951 to March 11, 1952. In order to compare the total value obtained in 1950–52, all precipitation was classified into four categories: snow, rain, sleet and hail so that the chemical components of Cl, S, Ca, Mg and K could be synoptically measured, as well as the mean value of rainfall amount and wind speed in the same period. By the same method each element, particularly the amount of Cl, was analyzed in relation to each category of precipitation and the relationship between Cl and other elements contained in all precipitation was determined. From the total mean values of each element and its ratio to various components, the following can be summarized: 1) rain contains more Cl than Ca and Mg, the latter were in the same proportional ratio to snow and rain; 2) hail contains more Cl than rain and snow; 3) relation between the amount of Cl content, wind speed and direction was irregular and of no specially different ratio; 4) Mg and Ca were constant in snow and rain, regardless of the amount of Cl; 5) relation between the amount of rain and NaCl content showed a disproportional ratio, possibly due to conglutination in time of descending. Pt. 3 contains the report of work done during the period Dec. 2, 1952 to March 16, 1953, the chemical elements contained in snow and rain were analytically examined at Niigata University. All tables include the result of calculated values of the following elements: Cl mg/l (all in the same weight), S, Ca, Mg, K, B, as well as the amount of rainfall, mean wind speed and weather conditions. Pt. 4 summarizes the authors' work. When the amount of Cl decreases the ratio of Ca and S increases reversely; when the amount of Cl decreases the ratio of Mg and K increases, and the amount of B seemed to be unrelated to the amount of Cl and S. *Subject Heading:* **1. Salt content in snow.**—*K.C.*

12G–158 551.577.13:546.13

Idogaki, Masatoshi (*Shimane Univ.*), **On the Cl in rain brought by typhoon at Hamada City in Shimane Prefecture.** *Kagaku* (*Chemistry*), Tokyo, 21(5):252–253, May **1951.** fig., table, refs. In Japanese. **DLC**—The author has determined the amounts of SO_4, pH and Cl in 71.4 mm of precipitation which fell in Hamada City during the typhoon on Sept. 13 to 14 of 1950. The author particularly analyzed the Cl element and its hourly variation. Measurements were made before the passage of the front and after the passage of the discontinuity. The author concluded that different amounts of Cl are due to the fact that in the first period it has a higher value because of its soluble condition in the atmosphere, the constitution of water drops, the falling speed of raindrops, wind direction (especially W-S) and the migration of the air mass. *Subject Headings:* **1. Chlorine in rainwater 2. Weather effects 3. Hamada City, Japan.**—*K.C.*

12G–159 551.578.11:546.41

Soudain, Y., **Analyse polarographique de l'eau de pluie: dosage du calcium.** [Polarographic method of calcium determination in rainwater analysis.] *Journal Scientifique de la Météorologie,* Paris, 3(11):102–106, April/June **1951.** 2 figs., 7 refs. **Pt. 2,** *Ibid.,* 5(17):16–20, Jan./March **1953.** **DWB**—Using the method suggested by P. Souchay and M. S. Peintre for quantitative determination of Ca in rainwater by the polarographic method, using chloranilic acid introduced in excess with pH = 5 as a reagent, the author (in Pt. 2) analyzed rainwater samples obtained at Trappes, France (Feb. 1950 to Sept. 1951) and compares results of Ca determination with K and Mg content of these samples mentioned in Pt. 1. Chart shows graphically that for each rainfall the Na content is greater than the Ca or Mg content, but the Ca content is usually twice as great as the Mg. In water the ratio of Ca/Mg is about 3:1. The method of G. BERTRAND (1943, 1947) is not applica to measurement of Ca and Mg content of individual falls of rain, but only to the average content number of falls. (*Same item as* 8.9–265, Sept. 1957, *Met. Abs.*) *Subject Headings:* **1. Rainwa analysis 2. Calcium in rainwater 3. Trappes, France.**—*M.R.*

12G–160 551.577.13:546.13:551.51

Takeuchi, U. and Nakazawa, Z. (*Shinsyu Univ., Nagano*), **On the relation between chlori of rain water and air mass.** *Geophysical Magazine*, Tokyo, 23(1):21–24, Dec. **1951.** 2 figs., 10 r DWB—Classification of trajectories of air masses near Japan is given; chlorinity of rain water maritime air masses up to 40 mg/l and about 12 mg/l in continental air masses. (*Same item* 4.10–211, Oct. 1953, *Met. Abs.*) *Subject Headings:* **1. Chlorinity of rainwater 2. Air mas 3. Weather influences on chlorinity 4. Japan.**—*A.A.*

1952

12G–161 551.577.13:546

*Ångström, Anders and Högberg, Linus (*Swedish Met. and Hydro. Inst.*), **On the content nitrogen (NH_4—N, and NO_3—N) in atmospheric precipitation, [Pt. 1].** *Tellus*, Stockholm, 4(1): 42, Feb. **1952.** 4 figs., 14 tables, 2 refs. **DLC**—Samples of precipitation taken between Oct. 1, 19 and Sept. 30, 1950 at the Agricultural College at Ultuna, Sweden (59°49′N and 17°40′E) were analy for NH_4—N and NO_3—N by the use of ion-exchange resins. Immediate filtering and other spec arrangements were made to eliminate errors from contamination by pollen, insects, etc. A mark dependence on duration of rain or snow was noted from analysis of 117 cases. Frequency tab seem to give relationship: $S = \alpha \log (1+P)$ where P is amount of precipitation up to moment of α is a constant and S is total amount of NH_4—N or NO_3—N, in Kg per hectare. The concentrati σ at the moment when a specified amount N has fallen is: $\sigma = 100. \frac{ds}{dp} = \frac{100\alpha.}{1-P}$ It can be se that σ decreases rapidly with increase in P. This seems to be due to a "washing out" process in t atmosphere. By using data for 117 cases sampled, an estimate is made of total amount of nitrog for all of the 190 cases which occurred in that period, yielding a total of 3.22 Kg per ha for NH_4— and 1.54 Kg/ha for NO_3—N, or an average annual amount of 1.90 and 0.91 Kg/ha respectively. analysis of thunderstorm cases didn't prove anything, but analysis by air masses showed NH_4— values of coefficient α of .0354 for Tropical air, .0262 for Polar air and .0172 for Arctic air and clou to indicate the masses which in an approaching low will pass a station. (*Same item as* 4.1–1, Ja 1953, *Met. Abs.*) *Subject Headings:* **1. Precipitation analysis 2. Nitrogen in precipitation 3. U tuna, Sweden.**—*I.L.D.*

12G–162 551.577.13:546.

Ångström, Anders and Högberg, Linus (*Swedish Met. and Hydrological Inst., Stockholm*), **On t content of nitrogen in atmospheric precipitation in Sweden, Pt. 2.** *Tellus, Stockholm,* 4(4):271–27 Nov. **1952.** 5 figs., 6 tables, 5 refs., 5 eqs. (see 12G–161). **DLC**—On the basis of the previously d veloped equation, $S = \alpha \log (1+P)$ in which S is the quantity of nitrogen transferred through the pr cipitation P and α is an arbitrary constant denoting the nitrogen concentration at the beginning of t precipitation, the authors have computed α NH_4—N and the total amount of NH_4—N Kg/ha for t different seasons and for the year for various parts of Sweden. Maps showing the geographic distribution of annual amount of NH_4 in precipitation and the geographical distribution of t average values of α for the year are given. It is suggested that the concentration of fixed nitrog in precipitation is the result of a photochemical process which explains the almost constant rat between NH_4—N and NO_3—N found frequently in the temperate zone. (*Same item as* 5.1–23 Jan. 1954, *Met. Abs.*) *Subject Headings:* **1. Nitrogen in precipitation 2. Precipitation analys 3. Sweden.**—*I.L.D.*

12G–163 551.577.13:546.1

*Eriksson, Erik (*Royal Agri. Col. of Sweden, Uppsala*), **Composition of atmospheric precipitatio Pt. 1, Nitrogen compounds.** *Tellus*, Stockholm, 4(3):215–232, Aug. **1952.** 6 figs., 5 tables. **DWB** The author presents a comprehensive survey of published data on the nitrogen content of atmospher precipitation, discusses the different cycles proposed for nitrogen in the atmospheric precipitati and evaluates the biologic importance of combined nitrogen in air and precipitation. The conten of this review cover nitrogen as ammonia and nitrate, albuminoid nitrogen, nitrite nitrogen, nitroge compounds in fog, dew, frost and condensed water from the air and the origin of nitrate and nitrit Tables giving the amount of ammonia and nitrate nitrogen in precipitation in Europe, Asia, Australi New Zealand, Africa and America, and monthly distribution of nitrogen compounds in precipitatio in a few representative localities are included. (*Same item as* 4.7–155, July 1953, *Met. Abs.*) *Subject Headings:* **1. Precipitation composition 2. Nitrogen in precipitation 3. Nitrogen compounds.** —*I.L.D.*

12G–164 **551.510.41**:**551.577.13**:016

†Eriksson, Erik (*Royal Agri. Col. of Sweden, Uppsala*), **Composition of atmospheric precipitation, Pt. 2, Sulfur, chloride, iodine compounds: bibliography.** *Tellus*, Stockholm, 4(4):280–303, Nov. **1952.** 11 figs., 14 tables, 317 refs. **DLC**—On the basis of a comprehensive and critical review of the literature (317 references are cited), the author discusses the combined sulfur content of the atmosphere and its annual variation; the origin of combined sulfur in the atmosphere; the annual and geographical variations of chloride in precipitation; the origin of chloride in precipitation; the meteorological factors influencing the chloride content of rainwater such as amount of rainfall, wind direction and wind strength and altitude; the Kohler distribution of chloride concentration in white frost formed at high altitudes by precipitation and freezing of undercooled water particles in clouds; the practical importance of the transport of oceanic salt inland; and the iodine content of precipitation and of air. (*Same item as* 5.1–103, Jan. 1954, *Met. Abs.*) *Subject Headings:* **1. Precipitation composition bibliographies 2. Sulfur content of air 3. Chloride in air 4. Iodine content of air.**—*I.L.D.*

12G–165 **551.578.11**:016

†Great Britain. Dept. of Scientific and Industrial Research. Fuel Research, **The composition of rain water bibliography.** East Greenwich, Fuel Research Station, **1952.** 7 p. Typescript. **GB-MO**—Abstracts are given of 33 papers issued between 1924 and 1947 in various parts of the world (all titles in English), including notes of the amounts and composition of dissolved impurities, methods of measurement, etc. (*Same item as* 4.2–209, Feb. 1953, *Met. Abs.*) *Subject Headings:* **1. Rainwater composition bibliographies 2. Rainfall analysis techniques.**—*C.E.P.B.*

12G–166 **551.577.13**:546.27 **551.577.13**:546.13

Muto, S., **Boron contents in rain waters.** *Chemical Society of Japan, Fukuoka, Journal* [*of the Pure Chemistry Section*], 73(6):446–448, June **1952.** fig., 4 tables, 7 refs. In Japanese. **DLC**—Quantitative and qualitative values of boron and chlorine were studied from the data obtained from Sept. 13 to 15 of 1951 in Gumma Prefecture. Tables show the following results:

Rainfall (mm)	2.9	17.1	2.0	3.0
Cl mg/l	1.34	2.91	1.31	0.38
HBO$_2$ mg/l	0.21	0.13	0.10	0.10
Ratio of B to Cl in sea water	0.16	0.05	0.08	0.26

In conclusion, the concentration of B in rain is incomparably higher than in sea water and at a given period of precipitation the rainfall of the first period contains more B than of the second period. *Subject Headings:* **1. Boron in rainwater 2. Chlorine in rainwater 3. Gumma, Japan.**—*K.C.*

12G–167 **551.577.13**:546.17

*Tamés Alarcon, C.; Aguirre, J. and Peral, M. T., **Importancia de los compuestos nitrogenados aportados por las precipitaciones atmosphéricas nel balance del nitrogeno di los suelos cultivados en los climas secos.** [Nitrogen in atmospheric precipitation.] *Spain. Instituto Nacional de Investigaciones Agronómicas, Boletín*, No. 26/27:195–231, **1952.** 28 tables, 4 appendices. **DA** (105.6 Sp14), **DLC** (S15.S85)—Recognizing the lack of an adequate analysis for dry climates compared to the numerous analyses of other climates, the description and results of a two-year experiment n Madrid are presented. The investigation deals with nitrogen extracts of different areas, influence f the nitrogen supplied by rainwater and the balance of the nitrogen of the soil, a factor not explicable except by the beneficial effect of first plowing. The appendices, containing the tabulated esults of observations, refer to the quantities of nitrogen extracted from crops; the content of itrogenized fertilizers of atmospheric precipitation including the analysis of nitrogen in the precipitation at the Chemical-Agricultural Station, Madrid from May 15, 1950 to April 30, 1952; the nfluence of nitrogen supplied by precipitation in proportion to the nitrogen of the soil and experiments on rye culture. The results are summarized. *Subject Headings:* **1. Nitrogen in rainwater . Madrid, Spain.**—*O.T.*

12G–168 **551.577.13** **551.510.41**:546.17

Virtanen, Arturi I. (*Biochemical Inst., Helsinki*), **Molecular nitrogen fixation and nitrogen cycle n nature.** *Tellus*, Stockholm, 4(4):304–306, Nov. **1952.** fig., 11 refs. **DWB**—The NH$_4$—N in recipitation originates from the soil, NO$_3$—N and NO$_2$—N present in rainwater are produced by xation caused by the action of electric discharges on molecular nitrogen. It is however, quite possible that most of the N_2 fixation in the atmosphere is photochemical and the conditions for fixation probably exist in the ozonosphere. Also some of the NO_3—N of the atmosphere may formed through oxidation of NH_4—N. Man's industrial activity contributes nitrogen to atmosphere.. (*Same item as* 5.4–197, April 1954, *Met. Abs.*) *Subject Headings:* **1. Atmosph composition 2. Nitrogen compounds 3. Rainwater analysis 4. Origin of chemicals in precip tion.**—*I.L.D.*

12G–169 **551.577.13**:553.

†Woodcock, A. H., **Atmospheric salt particles and raindrops.** *Journal of Meteorology*, 9(3):2 212, June **1952.** 16 figs., 7 tables, 31 refs. Also issued as: Woods Hole Oceanographic Institut Contract Nonr 27702(NR-082-021), Technical Report No. 14, Sept. **1951.** 28 p. photos, diag graphs, bibliog.—Atmospheric sea salt data are presented in the form of distribution curves wh show the number of sea salt particles (of a given weight range) sampled at different altitudes plot against the weight. Computations show that "in the process of growth the droplets contain each salt particle grow to raindrop size through coalescence with much more numerous and relativ non-saline cloud droplets. The numbers of droplets in cumulus clouds over the sea are compa to the numbers of condensation nuclei in the sub-cloud layer and to the number of larger sea- particles. A method of sampling the large sparsely-distributed salt particles in the atmospher described briefly. (*Same item as* 3.11–184, Nov. 1952, *Met. Abs.*) *Subject Headings:* **1. Salt atmosphere 2. Salt in rainwater.**—*M. P. Kramer.*

1953

12G–170 **551.577.13**:54

Dansgaard, W. (*Biophysical Lab., Univ. of Copenhagen*), **The abundance of O^{18} in atmosphe water and water vapour.** *Tellus*, Stockholm, 5(4):461–469, Nov. **1953.** 5 figs., 2 tables, 17 re 19 eqs. **DLC**—Investigations into the O^{18} abundance in the precipitation from a warm front rev a distinct process of fractionation explainable by the unequal pressures of the saturated vapors H_2O^{16} and H_2O^{18}. An explanation is given of the low O^{18}-abundance in glacial waters. A meth of experimental investigation into the mechanism of the process of precipitation is discussed. (*Sa item as* 5.11–154, Nov. 1954, *Met. Abs.*) *Subject Headings:* **1. Oxygenated water 2. Precipitat mechanism.**—*Author's abstract.*

12G–171 **551.510.42**:551.510.52 **551.578.11**:551.510

*Junge, Christian, **Die Rolle der Aerosole und der gasförmigen Beimengungen der Luft Spurenstoffhaushalt der Troposphäre.** [The role of aerosols and gaseous impurities of the atm phere in the chemical balance of the troposphere.] *Tellus*, Stockholm, 5(1):1–26, Feb. **1953.** figs., 9 tables, bibliog. p. 26. **DLC**—The size distribution curves for aerosols in the atmosphere Frankfurt a.M. and Taunus Observatory, Feldberg (800 m) are extended to the ranges 0.005 0.1μ radius on the basis of ion measurements at Frankfurt and Zugspitze, respectively. The ma mum frequency occurs at about 0.08μ. From these measurements the total volume of impurities a given volume of air near the ground is calculated according to 3 categories: Aitken, large and gia nuclei, respectively. The relative importance of the Aitken particles (.005 to $.1\mu$) is small compar with that of the 0.1 to 1μ (large) or the 1.0 to 20μ (giant) particles (the latter 2 size distributi contribute about equal volumes). The results of Woodcock on the spectrum of sea salt partic in sea air over the coast of New England agree very well with those obtained by sedimentat methods at Frankfurt. The effect of vertically changing austausch (A) on particle count is ill trated for 5 different time intervals and 3 values of A. The effect is completely negligible at a heig of 100 m but is quite pronounced at heights up to 25 m. Finally, an extensive summary is given recent results of the author, W. Jacobi and W. Lippert (*see* 4.4–185, April 1953, *Met. Abs.*) chemical analysis of natural aerosols by determining the dispersion of electrons. Smaller nuc ($<1\mu$) are mostly ammonium sulfate, whereas NaCl nuclei are generally $>1\mu$. Electron microsc determinations and, finally, results of chemical analysis of rainwater are discussed and tabulat along with results of other authors in various parts of the world. (*Same item as* 5.1–105, Jan. 19 *Met. Abs.*) *Subject Headings:* **1. Aerosol content of atmosphere 2. Condensation nuclei spectru 3. Chemical analysis of aerosols 4. Chemical composition of rain 5. Frankfurt a.M., German** —*M.R.*

12G–172 **551.577.13**:546.3

*Kalle, Kurt, **Zur Frage des "cyclischen Salzes."** [Problem of 'cyclic salt.'] *Annalen Meteorologie*, Hamburg, 6(9/10):305–314, **1953/1954.** 8 figs., 5 tables, 12 refs. German and Engli summaries p. 305. **DLC**—The distributions of chlorine (Cl) and sodium (Na) ions in precipitati at 27 stations in Sweden are plotted. Ratios of Na, Ca and K to Cl greatly exceed those in s water and rise considerably inland and to the north. This suggests that most of the Ca and K io in rain are of land origin. Assuming that the sea is the sole source of Cl, the part of the Na, Ca and K which is of land origin is calculated. A hypothetical "primary dust" of lithosphere origin is postulated, depending on the nature of the rock, the Na of the soil being exchanged for the Ca and K of the rain. (*Same item as* 6.11-299, Nov. 1955, *Met. Abs.*) *Subject Headings:* **1. Chemical composition of rain 2. Sweden.**—*C.E.P.B.*

12G–173 **551.510.41:551.577.13**

Maksimovich, G. A., **O roli atmosfernykh osadkov v perenose rastvorennykh veshchestv.** [The role of atmospheric precipitation in the transfer of dissolved substances.] *Akademiia Nauk SSSR, Doklady,* 92(2):401–403, Sept. 11, **1953.** 11 refs. **DLC**—A discussion of the sources of the mineral content of water of clouds and of precipitation. The mineral content of clouds is derived from oceanic waters and from volcanic gases. Chemical analysis of atmospheric precipitation of the U.S.S.R. showed that mineral content varied with geographic zone: forest zone—HCO_3—Ca; steppe—HCO_3—SO_4; desert—HCO_3—SO_4—Cl—Na; and near the coasts—HCO_3—Ca—Na (Odessa); HCO_3—SO_4—Na (Osipenko). The role of atmospheric circulation in mineral composition and content of atmospheric water is discussed. (*Same item as* 5.8–86, Aug. 1954, *Met. Abs.*) *Subject Headings:* **1. Rainfall composition 2. Chemical analysis of condensation nuclei 3. U.S.S.R.**—*I.L.D.*

12G–174 **551.510.41:551.578.11**

Mordy, W. A., **A note on the chemical composition of rainwater.** *Tellus,* Stockholm, 5(4):470-474, Nov. **1953.** 5 figs., 2 tables, 5 refs. **DLC**—A limited number of observations of nitrogen, sodium and chloride in rainwater made in Hawaii are presented. Because of frequent and high rainfall, calculations of the annual amounts of nitrogen received in various island localities are rather large. In one storm nitrogen was brought down by rainfall at a nearly constant rate although rainfall intensity varied considerably. In general, the concentrations of these elements in Hawaiian rains agree with observations in other oceanic areas. (*Same item as* 6.2–97, Feb. 1955, *Met. Abs.*) *Subject Headings:* **1. Chemical composition of rainwater 2. Nitrogen 3. Hawaii.**—*Author's abstract.*

12G–175 **551.577.13:546.27** **551.577.13:546.13**

Muto, S., **Boron contents in the river water affected by rain,** *Chemical Society of Japan, Fukuoka, Journal* [*of the Pure Chemistry Section*], 74(2):99-101, Feb. **1953.** fig., table, 7 refs. In Japanese. **DLC**—Investigations of B and Cl were made in the Torase and Kiryu Rivers in Gumma Prefecture for 22 days in June of 1952. Since the weather would affect the chemical composition, the author divided the river function into two periods according to increasing and decreasing of water level. He has estimated by analytical methods the potential difference between the mean value of B by 0.12 mg/l and of Cl by 9.2 in the Torase and that of B by 0.09 mg/l and of Cl by 7.1 mg in the Kiryu. It is interesting to note that the total amount of N/10 potassium permanganate and carbonic acid was remarkably higher in the Kiryu River as different from B and Cl in the Torase. The period of increasing water level, therefore, would show a decrease in the soluble amount of B as distinct from an increase of B in the period of decreasing water. *Subject Headings:* **1. Boron in rainwater 2. Chlorine in rainwater 3. Gumma Prefecture, Japan.**—*K.C.*

12G–176 **551.577.13:551.510.41,**

Muto, Satoru, **Comparison of chemical composition in rain and snow at Kiryu.** *Chemical Society of Japan, Fukuoka, Journal* [*of the Pure Chemistry Section*], 74(6):420–423, June **1953.** 3 tables, 6 refs. In Japanese. **DLC**—The chemical composition of rainfall and snowfall are remarkably different due mainly to evaporated residue and different solubility caused by the variation of descending air. Analytical experimentation was carried out from Feb. to June of 1952 at Kiryu City in Gumma Prefecture. A comparison was made of the composition of snow and rain. It was found that: 1) Boron in rainfall that fell in the midst of the ocean contained a higher ratio in comparison to that of Cl in sea water itself, and Boron in Kiryu City was 200 times higher than that in sea water; 2) Boron, Na and K in rainfall were more abundant than in snowfall and 3) it is possible that Boron content in the ice of Antarctica and in snow may be in the same proportion. *Subject Headings:* **1. Chemical composition of precipitation 2. Boron in rainwater 3. Sodium in rainwater 4. Potassium in rainwater 5. Gumma Prefecture, Japan**—*K.C.*

12G–177 **551.577.13:546.27**

Muto, S. (*Dept. of Chemical Research, Gumma Univ.*), **On the variation of composite element in the river current.** *Chemical Society of Japan, Fukuoka, Journal* [*of the Pure Chemistry Section*], 74(7):576–578, July **1953.** 2 figs., table, 4 refs. In Japanese. **DLC**—In order to investigate the variation of Boron and other chemical constituents of rivers, an analytical study was made in the Tone, Kiryu and Torase Rivers, all in Gumma Prefecture, during the summer of 1952. Comparative analyses of river composition and weather conditions were tabulated and discussed in detail. The mean value of B in each river was as follows: 1. amount in the Tone was 0.39 mg/l; in the Ki 0.23 mg/l and in the Torase, 0.20 mg/l. 2) The source and cause of different values, the factors t are interrelated to one another in each river, and concentration and dilution of B were explai In general, the main source of B in all rivers was from the rainfall, hot springs, mineral springs hydration deposits. *Subject Headings:* **1. Boron in rainwater 2. Gumma Prefecture, Japan.**—*R*

12G–178 551.578:11:551.51

Richard, Claude and Vialard-Goudou, André, **Composition chimique de l'eau de pluie à Saig** [Chemical composition of rainwater at Saigon.] *Académie des Sciences, Paris, Comptes Ren* 237(23):1548–1550, Dec. 9, **1953.** Also their: **Etude pluviométrique, physico-chimique et écono que des eaux de pluie à Saigon (1950–1954).** [Pluviometric, physico-chemical and economic st of rainwater at Saigon, 1950–1954.] *Agronomie Tropicale,* Nogent-sur-Marne, 11(1):74–92, 19 **DLC**—Observations at the Institut Pasteur de Saigon in 1952 showed the relationship of nitro compounds to the extremely different quantities of rain in the SW and SE monsoon seasons. ion concentration of NO_3^-, NO_2^- and NH_4^+ decreases in direct ratio to rain, due to dissolution repeated washing of the atmosphere. The quantity of nitric ions in rainwater of the tropic often ten times as much as that in temperate regions. Its importance to rice culture coun balancing the lack of fertilizers is emphasized. *Subject Headings:* **1. Chemical composition of ra water 2. Saigon (Vietnam), Indochina.**—*O.T.*

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12G–179 551.577.13:551.510.41 551.579(

†Alekin, Oleg A., **Khimicheskii analiz vod sushi (pri statsionarnom ikh izuchenii).** [Chemi analysis of continental waters for stations studying them.] *Leningrad, Gidrometeoizdat.,* **19** 199 p. 37 figs., 26 tables (tables in appendix), 95 refs., eqs. **DLC** (QD142.A39)—A detailed gu for sampling and chemical analysis of the pH, CO_2, O_2, Fe, NO_2, NO_3, P, Si, NH_4, HCO_3, Ca, N SO_4 and Cl content of river, well, lake, underground water (and by analogy, rainwater) at hyd meteorological stations or laboratories in the U.S.S.R. Physical properties (transparency, co temperature, viscosity, ion concentration, etc.) are also treated. Where different methods may used, all are fully described. Equipment is illustrated, and tables, graphs, nomograms, and the presented for practical use. A good bibliography of Russian sources is also included. (*Same item* 8.9–17, Sept. 1957, *Met. Abs.*) *Subject Headings:* **1. Chemical analysis of water 2. Chemi analysis of rainwater 3. Hydrochemical manuals 4. Rainwater analysis techniques 5. USS** —*M.R.*

12G–180 551.577.13:551.510

Burkser, E. S. and Fedorova, N. E., **The role of the chemical composition of the atmosphe precipitations at the formation of natural waters.** *Kiev. Universitet, Naukovi Zapysky,* 13(4):155–1 **1954.** In Ukrainian. **DLC** (Q4.K5)—Two hundred samples of atmospheric precipitation w analyzed at 41 different points of the Soviet Union, and 43.2% of these samples contained 25– mg salts/l, and 13.6% of even had 50–100 mg salts/l. The predominant anions were SO_4^{--} a HCO_3^-, and the predominant cations were Na^+ and Ca^{++}. In certain parts of the Soviet Uni Na_2SO_4 is more prone to occur in the precipitation than in others. *Subject Headings:* **1. Chemi composition of precipitation 2. U.S.S.R.**—*E.Z.S.*

12G–181 551.57

Cauer, H. (*Chem. Climatology Inst., Hohenberg/Eger*), **Physiko-chemische Vorgänge bei Kondensation von Wasserdampf in der freien Atmosphäre.** [Physico-chemical processes involv in the condensation of water vapor in the free atmosphere.] *Geofisica Pura e Applicata,* 28:199–2 **1954.** 4 figs., 17 refs. German and English summaries p. 199.—Results of a study of these process carried out by the author in the Carpathian Mountains, on Zugspitze, Nebelhorn and Pic du M in the Pyrenees are presented. They show that condensation cannot take place in the free atm phere and at finite temperatures solely by the elastic encounter of water vapor molecules. On t basis of present day information, the presence of inter-molecular forces acting as factors determini the formation and growth of condensation nuclei must be recognized. These nuclei are subdivid into 3 categories: permanent, initial and mixed. This division is based on the physical and chemi nature of substances composing the nuclei or on their stability. Mixed nuclei originate from t coagulation of units of the two other categories. Initial nuclei supply the new composition wi the greatest part of the water. As mixed nuclei prevail—it is seldom possible in practice to determi initial nuclei by optical means or conimeters—determination must be made by comparative chemi studies. Although the chemical substance of nuclei in high mountains is the same as in plains, quantitative divergence of the components occurs with increasing altitude. Thus, the aerosol igh mountains is not the rarefied aerosol of plains, but a mixture of nuclei with different chemical ompositions. (*Same item as* 6F–292, June 1955, *Met. Abs.*) *Subject Headings:* **1. Condensation rocesses 2. Condensation nuclei.**—*A.M.P.*

12G–182 551.510.41:551.578.11:546

Emanuelsson, A. (*Royal Agric. Coll., Uppsala*); Eriksson, E. (*Univ. of Stockholm*) and Egner, H. *Royal Agric. College, Uppsala*). **Composition of atmospheric precipitation in Sweden.** *Tellus*, tockholm, 6(3):261–267, Aug. **1954.** 12 figs., 6 refs., eqs. **DLC**—Preliminary charts are presented ased on two years of data, to demonstrate the geographic distribution over Sweden of the annual mounts of Na, Cl, K, Ca, NH_3—N NO_3—N brought to the surface of the earth by precipitation. he ratios of these totals amounts to the total amounts of Na deposited during the same time interval re shown to possess systematic geographic distribution patterns. Comparisons are made between hese ratios and the corresponding quantities in sea water. The investigation is now being resumed o provide additional data from a larger number of stations and for longer time periods. (*Same tem as* 6.9–130, Sept. 1955, *Met. Abs.*) *Subject Headings:* **1. Chemical composition of rainwater . Geographic distribution of chemicals 3. Sweden.**—*Authors' abstract.*

12G–183 551.577.13

Fonselius, S. (*Inst. of Met., Univ. of Stockholm*), **Amino acids in rainwater.** *Tellus*, Stockholm, (1):90, Feb. **1954.** 2 refs. **DWB**—Albuminoid nitrogen has been found in rainwater (*see* Eriksson, 2G–163, 164), but it has not been analyzed qualitatively. The author collected and evaporated arge amounts of rain and snow water, in a vacuum until dry. The residues were subjected to paper hromatography. Spots were identified as glycine and alanine so it seems that amino acids are efinitely present in rainwater in small quantities. These amino acids (and 4 others) were synhesized by S. MILLER (*Science*, 117:528, **1953**) by electric discharge in a closed system containing ethane, ammonia, H_2O and nitrogen. (*Same item as* 6.7–267, July 1955, *Met. Abs.*) *Subject leadings:* **1. Precipitation analysis 2. Amino acids in precipitation 3. Chemical analysis of rainater 4. Stockholm, Sweden.**—*M.R.*

12G–184 551.577.11:551.510.41

Herman, F. A., **[Discussion of] A. Ångström and L. Högberg: On the content of nitrogen NH_4—N and NO_3—N) in atmospheric precipitation.** *Tellus*, Stockholm, 16(1):89, Feb. **1954.** WB—In Kentville, N. S. (Canada) during one year it was found that 2.004 pounds of NH_4—N nd 0.907 pound of NO_3—N and 6.07 pounds of S (sulphur) were supplied to the soil (per acre) uring one year (1952–53) by precipitation. The year was deficient in snowfall, so may not give a ue picture. On Aug. 15, 1953 a cyclonic rainstorm gave 2.19 in. rain in one day, and zero readings f NH_4—N and NO_3—N were obtained for the first time, precipitation for 24 hours at 10 stations om Norfolk, Va. to Yarmouth, N. S. showed heavy precipitation accompanying a tropical storm hich moved up the coast (Atlantic City 7.29″, Norfolk and Block Island 5.8″ and 4.9″). It is hought that the nitrogen compounds had been entirely washed out before air reached Nova Scotia. For abstract of original article, *see* 12G–162.) *Subject Headings:* **1. Nitrogen in precipitation . Kentville, Nova Scotia, Canada.**—*M.R.*

12G–185 551.510.41:546.264:061.3

Eriksson, E. (*Univ. of Stockholm, Inst. of Met.*), **Report on informal conference in atmospheric hemistry held at the Meteorological Institute, University of Stockholm, May 24–26, 1954.** *Tellus*, tockholm, 6(3):302–307, Aug. **1954.** **DWB**—A preliminary conference on cloud physics and atmosheric circulation in relation to atmospheric chemistry was held at the Institute of Meteorology in ockholm in Oct. 1952. At the second conference on May 24–26, 1954 the progress and present atus of knowledge of atmospheric chemistry in relation to synoptic conditions was reviewed, and ans formulated for a cooperative world-wide program of research and observation in this field. wo subjects are discussed at length: (1) atmospheric CO_2 cycle and (2) composition of atmospheric recipitation; projects were worked out for both. (*Same item as* 6.10–110, Oct. 1955, *Met. Abs.*) *ubject Headings:* **1. Atmospheric chemistry conferences 2. Carbon dioxide cycle 3. Precipitation mposition 4. Stockholm, Sweden.**—*M.R.*

12G–186 551.578.41:546.13

Koike, Tomiji and Hirota, Hidenori, **Study on the chlorine ion contained in the snowfall.** *ournal of Meteorological Research*, Tokyo, 6(7):274–276, Sept. **1954.** 6 figs., 3 refs. In Japanese; nglish summary p. 274. **DWB**—The chlorine ion contained in precipitation in the months Jan. and eb. 1951 at Niigata is quantitatively analyzed and the following conclusions are obtained: 1) In neral; the air of northerly wind, that is the wind from the sea, contains more chlorine ions (Cl mg/l) an that of southerly wind. 2) Cl (mg/l) increases in proportion to wind velocity. 3) The cold air mass of continental origin contains ions of larger volume than those contained in the war mass of oceanic origin. (*Same item as* 9.11–254, Nov. 1958, *Met. Abs.*) *Subject Headings:* **1. Chlo in snow 2. Snow composition 3. Niigata, Japan.**—*Authors' abstract.*

12G–187 **551.578.11:541.1**

Landsberg, Helmut E., **Some observations of the pH of precipitation elements.** *Archiv Meteorologie, Geophysik und Bioklimatologie, Ser. A,* 7:219–226, **1954.** 3 figs., 5 tables, 7 English, German and French summaries p. 219. **DLC**—Tests of individual droplets, snowfla etc. made in Boston with ρ Hydrion papers show values of 3–5.5. Data from other authors compared. No definite variation was found with time in shower or with season, mean pH incre with increasing rain intensity (drizzle 3.46, heavy rain 4.18). Mean for liquid precipitation 3 solid 4.43, dew 4.3. (*Same item as* 5.11–155, Nov. 1954, *Met. Abs.*) *Subject Headings:* **1. Precip tion composition 2. pH of rainwater 3. Boston, Mass.**—*C.E.P.B.*

12G–188 **551.577.13:551.510.41:551.515.2:54**

Miyake, Y. and Sugiura, Y., **The chemical studies of rain water accompanied by a typh** *Geophysical Magazine,* Tokyo, 26(1):29–34, Aug. **1954.** 3 figs., 4 tables, 8 refs., 5 eqs. **DW** Authors propose mathematical expressions representing the mechanism which causes variation the chloride and sulphate content of rain during typhoons. Results of the formulas are found t in good agreement with the observed fact that in rainfall during a typhoon "the chlorinity rati sulphate decreases with increasing chlorinity of water, down to even below the sea water value, the time of its minimal value often coincides with that of the maximum value of the chlorini (*Same item as* 6.9–253, Sept. 1955, *Met. Abs.*) *Subject Headings:* **1. Chemical composition of r water 2. Typhoon effects on rainfall 3. Chlorinity.**—*G.T.*

12G–189 **551.577.13:551.51**

Takahashi, Yoshi, **Rain. In: Dictionary of Meteorology,** Tokyo, Central Meteorological servatory, **1954.** p. 14. table. In Japanese.—Table 5 is entitled **Result of chemical analysi rain (snow).** **DLC**—The data was collected at the Kobe Marine Observatory from July 1951 June 1952 and included the amount of rainfall (mm) as well as the following elements: pH, Cl (m S (mg), N (mg), and Ca (mg). The unit of value is calculated on the basis of 1m^2 of areal precip tion, except for the value of pH. It is concluded that the amount of Cl is high in the rain wh falls on a mountain in an inland district, and that much S and N is contained in city rainfall. *Sub Headings:* **1. Chemical composition of rainwater 2. Kobe, Japan.**—*K.C.*

12G–190 **551.577.13:551.510**

†Teichert, F. and Greifenhagen, B. (*Dresden-Wahnsdorf, Met. Obs.*), **Physikalisch-chemis Regenwasseruntersuchung.** [Physico-chemical investigation of rainwater.] *Zeitschrift für teorologie,* Berlin, 8(9):275–281, Sept. **1954.** 33 refs. **DWB**—The importance of rainwater anal in determining the chemical composition of atmospheric layers and to agriculture is considered the various methods used to study the physico-chemical characteristics of rainwater are descri These methods involve the determination of turbidity, fluorescence, pH value and chlorine, sulf ammonia and nitrate content and organic substances. (*Same item as* 6.10–232, Oct. 1955, *Met. A* *Subject Headings:* **1. Chemical composition of rainwater 2. Chemical analysis of rainfall.**—*I.L.*

12G–191 **551.577.11:551.594**

Voronkov, P. P., **O nekotorykh zakonomernostiakh formirovaniia khimicheskogo sost atmosfernykh osadkov.** [Some principles of the formation of the chemical constituent of atmosphe precipitation.] *Akademiia Nauk SSSR, Doklady,* 98(5):765–768, Oct. 11, **1954.** table, 12 r **DLC**—Evidence is presented showing that the principal source of Cl^- ions for atmospheric precipi tion in the northern regions of the U.S.S.R. are the very small NaCl condensation nuclei. T explains the small or more or less constant Cl^- ion content of the atmospheric precipitation and of surface waters. The concentration of SO_4^{--} ions depends upon the atmospheric pollution with S and is hence more variable. The constancy of Cl^- ions is explained by precipitation forming pr esses of condensation or coagulation. The variation of other ions and the increase in Cl^- i depend upon the washing out of pollutants from the atmosphere. (*Same item as* 8.3–262, Ma 1957, *Met. Abs.*) *Subject Headings:* **1. Precipitation composition 2. Ion production 3. U.S.S** —*I.L.D.*

12G–192 **551.577.13:551.510**

Votintsev, K. K., **Khimicheskiĭ sostav vod atmosfernykh osadko Prvibaĭkal'ia.** [Chemi composition of precipitation in the Baikal area.] *Akademiia Nauk SSSR, Doklady,* 95:979–9 April 11, **1954.** tables, 2 refs. **DLC**—Data on chemical analyses of snow, rime, and rain ma during 1951–1953 in the region of Bolshie Koty are tabulated. Rime crystals were free of organic solids but snow and rain contained up to 3–5 mg of organic material per l. The amount of HCO_3 reached 4.24 mg/l in rime and varied between 4.39–5.90 mg/l for snow. The Ca content in precipitation varied from 1.1–2.1 mg/l. *Subject Headings:* **1. Chemical composition of precipitation 2. Lake Baikal, U.S.S.R.**—*SIPRE.*

1955

12G–193 **551.577.13**:541.132.3

Barrett, Earl (*Woods Hole Oceanog. Inst.*) and Brodin, Gunnar (*Roy. Agric. College, Uppsala*), **The acidity of Scandinavian precipitation.** *Tellus*, Stockholm, 7(2):251–257, May **1955.** 4 figs., 6 refs. **DLC**—Data on the pH of the total monthly precipitation at stations of a Swedish network for sampling and chemical analysis of precipitation and atmospheric aerosols during the year July 1953–June 1954 are presented and discussed, together with the pH data from the first two months of operation of a larger pan-Scandinavian net. It is found that well-defined regions of acidity and alkalinity relative to the pH of water in equilibrium with atmospheric carbon dioxide exist, and that these regions persist to such an extent that the monthly deviations from the pattern of the annual mean pH at each station are relatively small. The mean pH of the entire network shows a distinct annual cycle, with greatest acidity in winter and greatest alkalinity in late spring. Coastal stations unaffected by local pollution show persistently high acidity, while inland northern stations show equally persistent alkalinity. Some possible reasons for the observed distributions are considered. (*Same item as* 7.5–205, May 1956, *Met. Abs.*) *Subject Headings:* **1. pH content of precipitation 2. Chemical composition of precipitation 3. Chemical climatology 4. Chemical analysis of rainfall 5. Sweden 6. Norway.**—*Authors' abstract.*

12G–194 **551.577.13:551.510.41**

Borrel, F., **Sur une méthode polarographique de dosage de l'ion Cl⁻ dans les eaux météoriques.** [A polarographic method of Cl⁻ ion sampling in rainwater.] *Journal Scientifique de la Météorologie*, Paris, 7(26):233–239, April/June **1955.** 2 tables, 3 refs. French, English and Spanish summaries p. 233. **DWB**—Details of a polarographic method of determining, to an accuracy of 2%, the amount of Cl⁻ ion in rainwater, using samples of 300 cc having no less than 0.1 mg of Cl⁻ are set forth systematically. The method makes use of an excess of Ag^+, neutralized by CrO_4. Samples are prepared during concentration by using NaOH and CH_3COOH to make up for abundance of other ions in rainwater (SO_4, CO_3, Na, K, NH_4, Ca, Mg and NO_3) if present in smaller quantities than the Cl⁻. (*Same item as* 9.3–229, March 1958, *Met. Abs.*) *Subject Headings:* **1. Rainwater analysis 2. Chemical analysis of rainwater 3. Chlorinity of rainwater 4. Sampling techniques.**—*M.R.*

12G–195 **551.510.41:551.577.13**

Durov, S. A. and Fedorova, N. E., **Istochniki ionno-solevogo sostava atmosfernykh osadkov SSSR.** [Sources of the ionic-saline composition of atmospheric precipitation.] *Akademiia Nauk SSSR, Doklady*, 103(4):663–665, **1955.** 2 figs., table, 10 refs. **DLC.** Also: Chilingar, George V. (*Wright-Patterson A.F. Base, Ohio*), **Durov's classification of natural waters and chemical composition of atmospheric precipitation in USSR: a review.** *American Geophysical Union, Transactions*, 37(2):193–196, April **1956.** 3 figs., table, 6 refs. **DWB, DLC**—Extensive observations of the salt content of the atmosphere (precipitation, rain, snow, hail) carried out over the U.S.S.R. are analyzed with reference to the marine or continental origin of these salts. An analysis of atmospheric salt samples indicates that only 27% of the salts of atmospheric precipitation over the U.S.S.R., is of marine origin while the rest of the salts enter the atmosphere as aerosols from the surface of continents. A table giving the mean composition of 190 specimens of atmospheric precipitation over the U.S.S.R. and calculation of their original composition is presented. These conclusions are based on samples obtained in coastal regions. The percentage of salts of continental origin would probably prove greater if more interior areas had been included. The article by CHILINGAR reviews both the above article and also DUROV'S **Classification of natural waters** (*see Akademiia Nauk, SSSR, Doklady*, 59(1):87–90, **1948**). (*Same item as* 9.10–153, Oct. 1958, *Met. Abs.*) *Subject Headings:* **1. Air sampling and analysis 2. Salt content of precipitation 3. Marine influences 4. U.S.S.R.**—*I.L.D.* and *M.R.*

12G–196 **551.510.41:551.577.13**

Egner, Hans (*Royal Agric. Coll., Uppsala*) and Eriksson, Erik (*Met. Inst., Stockholm Univ.*), **Current data on the chemical composition of air and precipitation.** *Tellus*, Stockholm, 7(1):134–139, Feb. **1955.** map, table, 4 refs. **DLC**—A network of air and precipitation sampling stations was established in Scandinavia (including Finland and Denmark) and in the United Kingdom during the winter of 1954–5. Chemical composition of samples collected according to specifications and sent to Uppsala each month (where analysis is made in the Royal Agricultural College of Sweden) are given in 4 tables, listing the amount of precipitation and the S, Cl, NO$_3$—N, NH$_3$—N, Na, K, Ca, pH, HCO$_3^-$ and conductivity values of precipitation; and the S, Cl, NH$_3$—N, Na, K, Mg Ca Nov. and Dec. 1954 for 45 stations (except for some missing data). This will be a regular feat of Tellus. Details of equipment, analysis techniques, etc. are given. (*Same item as* 7.9–123, S 1956, *Met. Abs.*) *Subject Headings:* **1. Chemical composition of atmosphere 2. Chemical comp tion of precipitation 3. Chemical climatology networks 4. Northwest Europe.**—*M.R.*

12G–197 551.577.13:51

Egner, H.; Brodin, G. and Johansson, O., **Sampling technique and chemical examination of and precipitation. Pt. 1–4,** *Uppsala. Lantbrukshögskolans, Annaler*, 22:369–410, **1955.** figs., r **Pt. 1, Sampling technique,** p. 369–382. Pt. 2, **Determination of sulfur compounds,** p. 382– Pt. 3, **Determination of chloride,** p. 391–394. Pt. 4, **Chemical examination,** p. 394–410. **D** (S539.S8U58), **DA** (104 Up6)—In Pt. 1, sampling techniques and chemical examination of air precipitation are explained. Photographs and diagrams illustrate the equipment used. In Pt a detailed description is given of a method for conductometric titration of sulfate in samples of and precipitation. In Pt. 3, a detailed description is given of a method for conductometric titrat of chloride in samples of air and precipitation. Pt. 4 gives a detailed description of the chem examination of precipitation and air sampling solutions. *Subject Headings:* **1. Sampling techniq 2. Analytical methods 3. Chemical analysis of precipitation 4. Chemical analysis of air.**—*E.Z.*

12G–198 551.482.214 551.510.41:551.578

†Eriksson, Erik (*Inst. of Met., Stockholm Univ.*), **Air borne salts and the chemical composit of river waters.** *Tellus*, Stockholm, 7(2):243–250, May **1955.** 4 figs., 24 refs., eq. **DLC**—T yearly discharge of chloride by rivers in Scandinavia and in the eastern United States is shown two charts. The isochlor pattern strongly indicates the marine origin of chloride. From composition of river, lake and ground water compared to rain water it is inferred that the salt these are to a very great extent air borne. (*Same item as* 7.6–105, June 1956, *Met. Abs.*) *Sub Headings:* **1. Air-borne salts 2. Chemical content of rivers 3. Chemical composition of rainwa 4. Sweden.**—*Author's abstract.*

12G–199 551.510.41:546.264:06

Eriksson, Erik (*Inst. of Met., Stockholm Univ.*), **Report on the second informal Conference Atmospheric Chemistry, held at the Meteorological Institute, University of Stockholm, May 3 June 4, 1955.** *Tellus*, Stockholm, 7(3):388–394, Aug. **1955. DLC**—The participants at the co ference are listed and the proceedings are summarized. Papers were delivered on the history of t present network for the study of chemical climate, the CO$_2$ network in Scandinavia, rate of exchan of CO$_2$ between air and sea, the influence of combustion of fossil fuels on atmospheric CO$_2$, on sampli of CO$_2$, atmospheric chemistry in France, practical application of research in atmospheric chemist relationship between atmospheric chemistry and pollution and health, analyses techniques, e (*Same item as* 7.11–44, Nov. 1956, *Met. Abs.*) *Subject Headings:* **1. Atmospheric chemistry confe ences 2. Carbon dioxide in the atmosphere 3. Stockholm, Sweden.**—*I.L.D.*

12G–200 551.510.42:551.578.

Gorham, Eville, **On the acidity and salinity of rain.** *Geochimica et Cosmochimica Acta*, Londo 7:231–239, **1955.** 9 figs., 3 tables, 10 refs. **DLC**—Samples of rain collected on Claife Height above western shore of Lake Windermere in May–Oct. 1954, were analyzed. NaCl was oft important, especially in fall; this and MgCl were probably derived from sea spray. SO$_4$, whi was correlated with soot, was greatest in spring and probably came from industrial pollution. C and K were correlated with each other and with SO$_4$. Effects on vegetation are discussed. (*San item as* 8.2–104, Feb. 1957, *Met. Abs.*) *Subject Headings:* **1. Rain composition 2. Atmospher pollutants 3. Lake Windermere, Eng.**—*C.E.P.B.*

12G–201 551.574.1:551.510.4

Houghton, Henry G., **On the chemical composition of fog and cloud water.** *Journal of M teorology*, Boston, 12(4):355–357, Aug. **1955.** 2 tables, 6 refs. **DLC**—The partial chemical analys of some ninety samples of fog and cloud water is reported. The fog samples were collected at fou locations along the northeast coast of North America, and the cloud samples were obtained on M Washington, New Hampshire. It is found that the soluble nuclei are predominantly chlorides an sulfates. The chlorides are dominant in air with a recent trajectory over the sea, while the sulfat is always present. In many cases it appears that much of the sulfate is in the form of sulphuric acid (*Same item as* 6I–136, Sept. 1955, *Met. Abs.*) *Subject Headings:* **1. Soluble nuclei 2. Chlorid nuclei 3. Sulphuric acid nuclei 4. Fog nuclei 5. Nuclei trajectories 6. Atlantic Coast 7. M Washington, N. H.**—*Author's abstract.*

12G-202 551.571.42:546.132

Lodge, James P., **A study of sea-salt particles over Puerto Rico.** *Journal of Meteorology*, Boston, 12(5):493-499, Oct. **1955.** 10 figs., table, 17 refs. **DLC**—Variations of nuclei concentration with altitude, meteorological conditions and with overland trajectory have been studied by the Cloud Physics Project on the basis of measurements made during eleven flights between Dec. 12, 1953 and April 16, 1954 near Puerto Rico. A number of ground samples was also taken. Arrangement used for sampling from aircraft is shown by a drawing, and results of observations are presented in graphs showing 1) the vertical distribution of nuclei content under various conditions and on various days, 2) variation of chloride nuclei concentration at ground level with distance inland, 3) variation of concentration of chloride particles of sizes $\geq 3\mu$, $\geq 6\mu$, and $\geq 10\mu$ with time, from 1205 h to 1335 h on Dec. 13, 1953, showing the effect of brief rain shower. (*Same item as* 6I-155, Sept. 1955, *Met. Abs.*) *Subject Headings:* **1. Chloride nuclei 2. Nuclei vertical distribution 3. Puerto Rico.**—*N.A.S.*

12G-203 551.577.13:551.510.41

*Mashima, Michio (*Inst. for Research in Fallen Snow*), **The chemical constituents of falling snow and rain.** *Studies in Fallen Snow*, Nagaoka, Japan, 5:83-100, **1955.** 6 figs., 15 tables, 6 refs., eqs. In Japanese. **DLC** (Orientalia)—For the analysis of the chemical components Cl, S, Ca, Mg, K and B, the author selected eight cities in Niigata Prefecture, considering distance and orographic conditions. The study covered the period from Dec. 1953 to April 1954. Tables show the result of analytical calculation, including the time and date of snow and rain gathered, amount of rainfall, each element in unit value and weather conditions, as well as mean wind speed and direction. The rainfall characteristics during the experiment in each city are discussed in relation to monthly variation of Cl amount and its relation to the amount of rainfall, and relation between the amount of Cl and different elements in snow and rain at a given moment and, finally, these elements were compared with one another. *Subject Headings:* **1. Chemical composition of rain and snow 2. Niigata, Japan.**—*K.C.*

12G-204 551.578.11:546.13 551.578.11:546.33

Mowat, Michael J. D., **Chlorine and sodium in precipitation.** *Weather*, 10(5):170, May **1955.** **DWB**—Variations in the ratio of chlorine to sodium in precipitation are attributed to the separation of the sodium (in the lower part of a drop) from the chlorine (in the upper part) by strong electric ields. When the drop splits transversely the sodium-rich part will fall as rain, the sodium combining with water and CO_2. The chlorine-rich part is carried upwards and forms hydrochloric acid; t falls in the later stages of a storm. (*Same item as* 6.8-293, Aug. 1955, *Met. Abs.*) *Subject Headings:* **. Rainwater analysis 2. Chlorine in rainwater 3. Sodium in rainwater.**—*C.E.P.B.*

12G-205 551.577.13:546.17:551.594.25

*Mukherjee, Asoke Kumar (*Met. Office, Jodhpur*), **Thunderstorm and fixation of nitrogen in rain.** *Indian Journal of Meteorology and Geophysics*, Delhi, 6(1):57-60, Jan. **1955.** 3 tables, 8 refs., 2 eqs. **DWB, DLC**—Recent determination of the nitrates and ammonia in rainwater in Sweden (ÅNGSTRÖM and HÖGBERG, 1952, *see* 12G-161) has led to the conclusion that thunder, i.e., electrical spark discharges in the atmosphere, is not the determining factor in the production of nitrogen compounds ormed in rain water. In the light of the above conclusion, available data of combined nitrogen n rain water in Sylhet, East Pakistan in 1933 and Bombay, India have been examined. It supports he conclusions reached by Swedish workers. (*Same item as* 8.3-261, March 1957, *Met. Abs.*) *Subject Headings:* **1. Nitrogen in precipitation 2. Thunderstorm effects on precipitation. I. Ångtröm, A.**—*Author's abstract.*

12G-206 551.510.41:551.577.13

Rossby, C.-G. (*Stockholm Univ.*) and Egner, H. (*Roy. Agric. Coll., Uppsala*), **On the chemical limate and its variation with the atmospheric circulation pattern.** *Tellus*, Stockholm, 7(1):118-113, Feb. **1955.** 16 figs., table, 16 refs. **DLC**—A study of the chemical composition of monthly preipitation samples from a number of stations in Sweden brings out the existence of significant variaions in the relative proportions of chlorides and sodium depending upon the general character of the revailing circulation. In maritime westerly flows the weight ratio of chloride to sodium decreases astward to values which lie far below the value characteristic of sea water. In precipitation falling from arctic or polar continental air masses the chloride component is almost completely absent. The highest amounts of chlorides relative to sodium are observed in precipitation from warm and moist air masses reaching Sweden from the south or southeast. Significant variations are observed lso in the yearly means of the sodium and sulphur deposits upon the dominance of maritime or continental air currents. A sketch map of the "average" chloride concentration in European recipitation prepared from miscellaneous older data lends support to the results of the analysis of he monthly data. The separation of the chemical components indicated by this study would seem to be of considerable geochemical interest since it would permit different maritime salts to be posited in widely separated parts of the continents. It is not inconceivable that a detailed st of the association between different circulation patterns and the corresponding chemical clima might permit us to draw inferences concerning variations in the atmospheric circulation during p glacial times, e.g., from the data on the chemical stratification in raised bogs now becoming availa through the investigations by MATTSON and KOUTLER-ANDERSSON. (*Same item as* 6.10–111, 1955, *Met. Abs.*) *Subject Headings:* **1. Chemical composition of rain 2. Chemical composition of atmosphere 3. Air mass climatology 4. Chemical climatology 5. Sweden.**—*Authors' abstract.*

12G–207 **551.578**

Turner, J. S., **The salinity of rainfall as a function of drop size.** *Royal Meteorological Soci Quarterly Journal,* 81(349):418–429, July, **1955.** 6 figs., 7 refs., 3 eqs. **DWB**—Raindrops divi into size ranges near Sydney, Australia, near coast and 45 mi inland and 2850 ft were analyzed sodium. For Bergeron type rain salinity varied from 1–41 ppm, roughly proportional to (radius) where n ranged up to 2.6 near sea. Inland the salinity was lower but tended to increase slightly $\gamma > 1$ mm. These results are explained by evaporation and collection of salt during fall. Salin of nonfreezing rain in Hawaii decreased from 2–20 ppm on coast to 0.34–8.5 at cloud base and 0. 3.8 in cloud at 4500 ft. It was least at drop diameter 0.8 mm (coast) to 0.5 (cloud). The salin of large drops is attributed to formation on giant nuclei and coalescence at an early stage; the fi drops to fall are large and of high salinity. (*Same item as* 6.11–303, Nov. 1955, *Met. Abs.*) *Sub Headings:* **1. Raindrop salinity 2. Sydney, Australia.**—*C.E.P.B.*

12G–208 **551.574.11**:551.4

Twomey, S., **The distribution of sea-salt nuclei in air over land.** *Journal of Meteorolo* 12(1):81–86, Feb. **1955.** 9 figs., 6 refs. **DWB**—Slides were exposed on an aircraft over S Australia following S.W. maritime air inland. Sections are shown. Results very variable and close correlation with mixing ratio or time over land. In an air stream undisturbed by precipitat or convective cloud formation the nuclei population was carried inland without appreciable reduct but became more uniform with height. Precipitation removed salt nuclei. Convective clo formation and subsidence caused discontinuities. (*Same item as* 6.5–223, May 1955, *Met. Ab Subject Headings:* **1. Saline nuclei distribution 2. Australia.**—*C.E.P.B.*

12G–209 **551.577.13**:546.

Weinmann, H., **Nitrogen content of rainwater in Southern Rhodesia.** *South African Jour of Science,* Johannesburg, 52(3):82–84, Oct. **1955.** 2 tables, 6 refs. **DLC** (Q85.S5)—Rainwa samples collected at the Salisbury Agricultural Experiment Station, southern Rhodesia, during t seasons 1953/54 and 1954/55 averaged 0.22 ppm of ammonia nitrogen and 0.11 ppm of nitrite-nitr nitrogen for the months of December to April. Early and late rains contained larger amounts nitrogen, most probably due to their dust content. There was no correlation between the nitri nitrate nitrogen content of the rain water and thunderstorm activity. In 1953/54 an annual rainf of 28.0 in. brought down 2.3 lbs of total nitrogen per acre; in 1954/55 the corresponding figures we 40.5 in. and 4.4 lb. In both years approximately $\frac{3}{4}$ of the total nitrogen was in the form of ammon It is estimated that the average annual rainfall of 33 in. at Salisbury brings down approximate 3 lbs. of total nitrogen per acre. *Subject Headings:* **1. Nitrogen in rainwater 2. Salisbury, Southe Rhodesia.**—*E.Z.S.*

12G–210 **551.578.11**:634.

Will, G. M., **Removal of mineral nutrients from tree crowns by rain.** *Nature,* Lond 176(4494):1180, Dec. 17, **1955.** table, 2 refs. **DWB**—Rain water beneath trees contained a mu larger content of salts than rain in the open, and is an important source of nutrients. (*Same item* 7.4–237, April 1956, *Met. Abs.*) *Subject Headings:* **1. Rain composition beneath trees 2. Ne Zealand.**—*C.E.P.B.*

12G–211 **551.574.11**:551.578.11:551.4

Woodcock, A. H. and Blanchard, D. C. (*both, Woods Hole Oceanog. Inst.*), **Tests of the sa nuclei hypothesis of rain formation.** *Tellus,* Stockholm, 7(4):437–448, Nov. **1955.** 5 figs., 7 table 12 refs., eqs. **DWB, DLC**—Atmospheric chlorides in sea salt nuclei and the chlorides dissolved shower rainwaters were recently measured in Hawaii. A comparison of these measurements revea the remarkable fact that the weight of chloride present in a certain number of nuclei in a cub meter of clear air tends to be equal to the weight of chloride dissolved in an equal number of rai drops in a cubic meter of rainy air. This result is explained as an indication that the raindrops gr on the salt nuclei in some manner which prevents a marked change in the distribution of these nucl during the drop-growth process. The data presented add new evidence in further support of t salt nuclei raindrop hypothesis previously proposed by the first author (WOODCOCK, 1952). (*Same item as* 7.8–193, Aug. 1956, *Met. Abs.*) *Subject Headings:* **1. Saline nuclei 2. Rain composition 3. Hawaii.**—*Authors' abstract.*

12G–212 551.577.13:546.32

Yoshimasa, Takashima, **On the potassium in rain water.** *Chemical Society of Japan, Journal, Fukuoka,* 76(10):1148–1151, **1955.** In Japanese. **DLC, DA**—The contents of K in rain waters collected at Fukuoka during Oct. 1953–September 1954 were determined by the method of cobaitinitrite contg. Co^{60}. The correlations of K and Cl contents of rain with wind were discussed. K is less easily washed out from air by rain than chloride. *Subject Headings:* **1. Potassium in rainwater 2. Fukuoka, Japan.**—*Chemical Abstracts, 12389b, 1957.*

12G–213 551.577.13:546.13 551.577.13:546.22

Zhavoronkina, T. K., **Soderzhanie kloridov i sul'fatov v atmosfernykh osadkakh po 33 meridianu.** [The Cl and SO_4 content in precipitation along 33°E longitude.] *Akademiia Nauk SSSR. Morskoĭ Gidrofizicheskiĭ Institut, Trudy,* 5:99–103, **1955.** figs., tables, 8 refs. **DLC** (GC1.A45)—Chemical impurities in snow and rain were studied in 1948 and 1949 in more than 25 areas located along 33°E long. between the Barents and Black Seas. Samples of fresh snow were collected away from railroads and industrial areas, and simultaneous meteorological observations were made. Data on the Cl and SO_4 content of the samples are tabulated. Maximum Cl contents (to 5.2 mg/l) were observed near the sea. An increase of Cl was also noted in the central industrial provinces in association with increased total pollution of the atmosphere. The SO_4 content in rain surpassed the Cl content. *Subject Headings:* **1. Chlorine in precipitation 2. Sulphates in precipitation 3. U.S.S.R.**

1956

12G–214 551.577.13:541

Cawer, H., **pH values of aerosols and atmospheric precipitation, and their industrial hygienic or bioclimatic significance.** *Zeitschrift für Aerosol-Forschung und -Therapie,* Stuttgart, 5:459–509, **1956.**—A review, which covers methods for condensing H_2O from air and for collecting actual precipitation in order to determine its pH. Extensive data are presented giving the pH-value range for condensed H_2O samples taken from a number of locations in Europe. *Subject Headings:* **1. pH of rainwater 2. pH effects on industrial hygiene 3. Europe.**—*Author's abstract.*

12G–215 551.577.11

*Chilingar, George V., **Cl' and SO_4'' content of atmospheric precipitation in USSR: a summary** *American Geophysical Union, Transactions,* 37(4):410–412, Aug. **1956.** 5 tables, 7 refs. **DWB, DLC**—The relative abundance of Cl' and SO_4'' anions in the atmospheric precipitation of U.S.S.R. is discussed in the present summary. In addition, the amounts of HCO_3', NO_3', $Na^{\cdot}$, $Ca^{\cdot\cdot}$, $Mg^{\cdot\cdot}$, and $NH_4^{\cdot}$ ions in the atmospheric precipitation are also presented. Review of the Russian literature indicates that the average SO_4'' content of atmospheric precipitation in U.S.S.R. is about twice as high as that of Cl' anion. This leads to a conclusion that the major portion of SO_4'' anions is not of marine origin. (*Same item as* 8.3–260, March 1957, *Met. Abs.*) *Subject Headings:* **1. Precipitation composition 2. Chlorine in rainwater 3. Sulfate in rainwater 4. Origin of SO_4 in rainwater 5. U.S.S.R.**—*Author's abstract.*

12G–216 551.578.11:551.510.41

Denisov, P. V., **Khimicheskiĭ sostav atmosfernykh osadkov severnogo Tian'-Shania.** [Chemical composition of atmospheric precipitation in northern Tien Shan.] *Akademiia Nauk SSSR, Doklady,* 110:842–843, **1956.** **DLC.**—Typical analysis for rainwater collected over a year in northern Tien Shan are given. In this period (1952–53) the following descending order of ion concentration was found: Ca, Na and Mg and HCO_3, SO_4, Cl, K, Cl, and SO_4 predominate in snow; Ca, SiO_2, and HCO_3 predominate in the rainwater. *Subject Headings:* **1. Chemical composition of rain 2. Chemical composition of snow 3. Tien Shan, Kirghiz S.S.R.**—*E.S.*

12G–217 551.578.11:551.510.41

Denisov, P. V. and Bugaev, A. L., **Khimicheskiĭ sostav atmosfernykh osadkov severo-vostochnoĭ Ukrainy.** [Chemical composition of precipitation in northeastern Ukraine.] *Akademiia Nauk SSSR, Doklady,* 108:879–881, June 11, **1956.** figs., tables, 3 refs. **DLC**—The chemical composition of rain and snow was studied in the Kharkov region in 1954–55. The analysis of 37 rain samples and 18 snow samples showed variations in mineral content of 13.14–72.52 mg/l. The average mineral content of snow was 34.21 mg/l, of rain 41.45 mg/l. Maximum mineral content of snow occurred

near 0°C and was probably due to the greater solubility of solid and gaseous matter in wet sno
Maximum mineral content of rain occurred at low temperatures. Differences in composition
rain and snow were similar to those observed in analyses made in the high mountain area of Ti
Shan. *Subject Headings:* **1. Chemical composition of precipitation 2. Kharkov, Ukrainian S.S.**
—*SIPRE.*

12G–218 551.577.13:546.

Epstein, Samuel (*California Institute of Technology, Pasadena*), **Variations of the O^{18}/O^{16} rati**
of fresh waters and ice. *National Research Council, Washington, D. C., Publication*, No. 400:20–
1956. DLC, DA—The O^{18} content of the water in rain or snow decreases with increasing elevati
but appears to be independent of the kind of precipitation. Summer snow has a higher ratio th
winter snow, and the isotope content of glaciers is not uniform. *Subject Headings:* **1. O^{18} in rain wat**
2. O^{18} in snow 3. Seasonal distribution of O^{18}.—*E.Z.S.*

12G–219 551.578.11:539.16:546.22:551.521.

Goel, P. S., **Radioactive sulphur produced by cosmic rays in rain water.** *Nature*, Londo
178(4548):1458–1459, Dec. 29, **1956.** fig., table, 4 refs. **DWB**—Rainwater at Banaras and Koda
kanal (India) was analyzed for total and radioactive sulfur. Tests showed the radioactivity w
due to sulphur-35. Most if not all was caused by cosmic radiation. *Subject Headings:* **1. Radi**
active sulphur 2. Cosmic ray effects 3. Rainwater analysis 4. Banaras, India 5. Kodaikana
India.—*C.E.P.B.*

12G–220 551.577:551.501.45:519.241

Grunow, Johannes, **Zur Erfassung und Statistik der kleinsten Niederschlage.** [Determinatio
and statistics of traces of precipitation.] *Geofisica Pura e Applicata*, Milan, 33:251–261, **195**
3 figs., 2 tables, 10 refs. English and German summaries p. 251. **DLC**—By means of logarithm
scales in statistical research on precipitation it is possible to study precipitation amounts less tha
0.05 mm which can be caught by raindrop recording. In this paper the author discusses the valu
of the logarithmic scale, the defects inherent in the analysis of small quantities, the technique
collecting and recording small amounts of rainfall, the daily totals in single precipitation analysi
and the frequency spectrum of the smallest rainfall amounts. *Subject Headings:* **1. Rainfall analys**
2. Statistical methods.—*I.L.D.*

12G–221 551.510.41:551.578.1

Junge, Christian E. and Gustafson, Philip E. (*U. S. A. F., Geophysics Research Directorat*
Cambridge, Mass.), **Precipitation sampling for chemical analysis.** *American Meteorological Societ*
Bulletin, 37(5):244, May **1956.** fig. **DWB**—A network of 67 U. S. W. B. stations in the U.
(including Air Weather Service Stations in Bermuda, the Azores, and Newfoundland and Coas
Guard ships at ocean stations Coca, Delta and Echo) collected samples of rainfall in polyethylen
bottles (with plexiglass funnels) for chemical analysis by Geophysics Research Directorate. Analyse
of average monthly concentration of NH_4, NO_2, Cl, Na, K, Cr, Mg and SO_3 ions were made t
determine geographic and seasonal distribution of these elements in rainwater. A map of U.
shows isarithms of Cl ion concentration in Aug. 1955. Highest value was 18.5 mg/l at Hattera
A value of <0.15 occurred over $\frac{3}{4}$ of the country. (*Same item as* 8.9–149, Sept. 1957, *Met. Abs*
Subject Headings: **1. Chemical analysis of rainwater 2. Rainfall analysis 3. Chlorinity of rain**
water 4. United States.—*M.R.*

12G–222 551.510.42:551.574.1:54

Junge, Christian E. (*U. S. A. F., Cambridge Research Center*), **Recent investigations in ai**
chemistry. *Tellus*, Stockholm, 8(2):127–139, May **1956.** 7 figs., 10 tables, 12 refs., eqs. **DLC**—
1. New results of chemical analyses of natural aerosol particles in Florida and in the Boston area ar
presented. 2. These data are compared with the results obtained earlier at various other location
The continental and maritime components of NH_4, Na, Cl, SO_4 and NO_3 can be separated for tw
different size ranges, viz. large particles (radius 0.08 to 0.8) and giant particles (radius 0.8 to 8)
It is found that the continental influence on aerosols extends far into the ocean. 3. The nitrat
content of the particles presents an especially interesting problem, since it appears that the majo
part of NO_3 stems neither from a continental nor from a maritime source, but from a certain are
along the coast. 4. A comparison is made of the total amounts of material found in the large and th
giant particles of the various locations. Information gained from this comparison provides th
basis for conclusions regarding the size distribution of aerosols. A pronounced difference betwee
maritime and continental distributions becomes evident in this case. 5. The concentration of th
corresponding gas traces of NH_3, SO_2, nitrogen oxides and chlorine components were measured i

lorida and at other locations simultaneously with the chemical analysis of the aerosols. For most omponents the concentration of these gas traces is considerably higher than that for the correspondng substances in the aerosols. The importance of these findings for air chemistry is discussed. *Same item as* 8.3–139, March 1957, *Met. Abs.*) *Subject Headings:* **1. Chemical analysis of aerosols . Aerosol origin 3. Florida 4. Massachusetts.**—*Author's abstract.*

12G–223 551.577.13:535.371

Kalle, K., **Fluoreszenzmessungen in Niederschlagswässern und in künstlichem Rauhreif.** Measurements of fluorescence of precipitation waters and of artificial hoar frost.] *Annalen der Ieteorologie,* Hamburg, 7(10/12):374–385, **1955/56.** 4 figs., 2 tables, 11 refs. German and English ummaries p. 374. **DLC**—Aerosols, natural, artificial and organic, are investigated by the photoietric measurement of fluorescence produced by irradiation with UV light. Rain over land and ea was most impure but became rapidly purer as it continued. Snow and drift ice showed considerble differences in short distances. Artificial hoar frost was formed on a flask of freezing mixture t Hamburg and on 3 voyages in the North Sea; maps of distribution are given and show that in eneral amounts with overcast skies are greater than with clear skies. (*Same item as* 8.10–233, Oct. 957, *Met. Abs.*) *Subject Headings:* **1. Precipitation composition 2. Fluorescence of precipitation.** –*C.E.P.B.*

12G–224 551.510.41:551.578.11

Larson, T. E. and Hettick, Irene (*both, Ill. State Water Survey*), **Mineral composition of rainvater.** *Tellus,* Stockholm, 8(2):191–201, May **1956.** 10 figs., 3 tables + tabular appendix, 12 efs., eqs. **DLC**—Analyses of 62 rainwater samples collected at the University of Illinois Airport ear Savoy, Ill., showed that on the basis of equivalent concentrations, the chloride is equal to the um of sodium and potassium. Sodium was three times the potassium. Calcium plus magnesium vas 10 times the chloride and equal to the sum of the bicarbonate and sulfate. The sulfate was qual to twice the sum of ammonium and nitrate. These results indicate salt from sea mist to onstitute a negligible proportion of the mineral content. They also indicate the presence of air ollutants by the combustion of fuel. (*Same item as* 8.3–132, March 1957, *Met. Abs.*) *Subject Ieadings:* **1. Chemical composition of rainwater 2. Savoy, Illinois.**—*Authors' abstract.*

12G–225 551.577:551.510.42

McCully, C. Roland; Fisher, Morris; Langer, Gerhard et al. (*Armour Res. Found. of Ill. Inst. f Tech.*), **Scavenging action of rain on air-borne particulate matter.** *Industrial and Engineering hemistry,* 48(9, Pt. 1):1512–1516, Sept. **1956.** 13 figs., table, 3 refs. **DLC**—Releasing fluorescent ust during rainstorms shows that four hours of moderate rain can cleanse 90% of larger dust parcles from the atmosphere. *Subject Headings:* **1. Rainfall effects on atmospheric pollution. I. Rosinki, Jan II. Glaess, Harvey III. Werle, Don.**—*Authors' abstract.*

12G–226 551.574.1:551.577.13:551.464

Mukherjee, A. K. (*Met. Off., Jodhpur*), **Salinity in rain water.** *Indian Journal of Meteorology nd Geophysics,* Delhi, 7(1):84–87, Jan. **1956.** table, 5 refs., 7 eqs. **DWB, DLC**—The salts in the tmosphere may be removed by (1) serving as condensation nuclei, or (2) by being washed out by ain. A mathematical basis for calculating the amount of salts dissolved or carried to the earth by ain is presented and examples of applications discussed. It is concluded that drizzle is more fective in precipitating salts and enriching the land thereby than is heavy rain (especially with itrates and ammonium salts) because small drops capture more salt than large drops, and because rizzle lasts longer than showers (the plot of nitrogen precipitated against time since the start of a ain is a straight line). (*Same item as* 10.4–255, April 1959, *Met. Abs.*) *Subject Headings:* **1. Salts y rain precipitated 2. Salt content of precipitation 3. Saline nuclei.**—*M.R.*

12G–227 551.577.13:546.27

Mūto, Satoru (*Inst. of Chemical Analysis, Gumma Univ.*), **Source of Boron in rain and snow.** *hemical Society of Japan, Fukuoka, Journal* [*of the Pure Chemistry Section*], 77(12):1770–1773, ec. **1956.** 3 figs., 3 tables, 11 refs. In Japanese. **DLC**—The author has partly refuted the validity the source of Boron previously suggested by E. TRUNNINGER, K. KALLE and SUGAHARA. Detailed nalysis showed a solubility of element and composition of salinity in the order of $\mathrm{Cl} > \mathrm{B} > \mathrm{Mg} > \mathrm{SO_4}$ Ca and proved that the main source of Boron is not only from the salinity, but also from plants ich as *Ginkgo biloba Linnaeus.* Tables show and prove the result that the forest conditions and dustrial chimney produced a microchemical particle, which is a major source of Boron. *Subject eadings:* **1. Boron in rainwater 2. Boron in snow 3. Boron from forests 4. Boron from industrial himney discharge.**—*K.C.*

12G–228 551.578.11:54

Oddie, B. C. V., **A note on the published results of studies in atmospheric chemistry.** *G Britain. Meteorological Research Committee, M. R. Paper* 1014, Nov. 12, **1956.** 5 p. 6 r Mimeo. **DWB**—This paper is "intended as a basis for a general discussion of policy with resp to chemical sampling." The history of atmospheric chemistry is summarized, including variati of chlorine/sodium ratio in rainwater. Questions requiring elucidation are listed; they req an extensive network of observing stations. Suggestions for further work are made. (*Same iten* 8.8–275, Aug. 1957, *Met. Abs.*) *Subject Headings:* **1. Atmospheric chemistry 2. Chlorinity of ra water.**—*C.E.P.B.*

12G–229 551.510.41:551.57

Tsyganenko, A. F., **O znachenii eolovogo faktora v solevom balanse sushi.** [Wind effects the salt balance of continents.] *Leningrad. Universitet, Vestnik,* 11(24):48–56, **1956.** tables refs. **DLC** (AS262.L463)—Salt transfer in the atmosphere and on the earth's surface is exami with emphasis on studies published from 1911–1952 on the chemical composition of precipitat and investigations on snow cover impurities made in the vicinity of Leningrad in 1953–1955. HCO_3, SO_4, and Ca content of snow cover in suburban Leningrad was 2–3 times greater than a site 60 km S. of Leningrad. The ion content of fresh-fallen snow was 3 times less than in snow co near the end of winter. The average deposition of salt from the atmosphere in the U.S.S.R 10–20 tons/sq km, a value close to the amount of salt normally discharged by rivers into the oce *Subject Headings:* **1. Chemical composition of precipitation 2. Leningrad, U.S.S.R.**—*SIPRE.*

12G–230 551.510.41:551.577

Utåker, Kare, **Om den kjemiske sammensetning av nedboren.** [On the chemical composit of precipitation.] *Naturen,* Bergen, 80(9):551–563, **1956.** 10 figs., table. **DLC**—This is a gene review of the network of Swedish chemical precipitation stations established in 1948 and which h co-operated with Denmark, England, Finland and Norway since Nov. 1954. Brief description instruments is given and some data on geographical distribution of chemicals from precipitation mapped and tabulated. It is shown that oceanic and human influences are the main factors affect the composition of precipitation. Atmospheric and cosmic sources are also considered. T chemicals investigated were: Cl^-, Na^+, K^+, Ca^{++}, N, NH_4^+, NO_3^-, Mg^{++}, S, SO_4^{++}. The pH val and electrical conductivity were determined. (*Same item as* 9.9–151, Sept. 1958, *Met. Abs.*) *Sub Headings:* **1. Chemical composition of precipitation 2. pH content of precipitation 3. Swed** —*W.N.*

12G–231 551.577.13:546

Winsberg, L., **Detection of chlorine-39 in rain water.** *Research Council of Israel, Bulle Sec. A, Mathematics, Physics and Chemistry,* 5:143–146, **1956.** 2 figs., refs. (last page missing in copy). **DA** (330.9 IS72b), **DNLM, DNIH**—"The discovery of chlorine^{39} in rain water offers a n means of studying problems in cosmic radiation and meteorology. For this purpose it is necessa to make meteorological measurements and improve the method of sample collection, chemi purification, and counting. Suggestions along this line are given." The production of chlorine^{39} the lower atmosphere by cosmic radiation and its subsequent detection in rain water provide potentially useful tool for the study of problems in cosmic radiation and meteorology. As a res of the 56 min half-life of chlorine^{39}, the pertinent phenomena are those which occur in the vicin and at the time of collection or shortly before. *Subject Headings:* **1. Chlorine^{39} in rainwater 2. C mic radiation.**—*Author's abstract.*

1957

12G–232 551.577.13:546.39:546

Coutinho, L. Pereira, **A composicao da aqua da chuva em amonia e acido nitrico na regiao Lourenço Marques.** [Composition of ammonia and nitric acid in rainwater in the Lourenço Marq region.] *Gazeta do Agricultor,* Mozambique, No. 100:258–261, **1957.** 2 figs., 2 tables, eq. (24 G25)—The compounds of ammonia and nitric acid in rainwater are examined, and a survey of t development of its research is presented, beginning with the basic observations of the Engl philosopher, Henry Cavendish (1731–1810) and ending with studies of nitric acid in France in 18 Various factors and conditions affecting the nitric acid and ammonia content of air are consider The amounts of nitric acid and ammonia contained in the atmosphere over Lourenço Marques a presented in a table and illustrated by diagrams with an extended value for the northern area of t region. Finally, the chemical analytical process of distillation is explained. *Subject Headin* **1. Ammonia in rainwater 2. Nitric acid in rainwater 3. Lourenço Marques, Mozambique.**—*O.*

12G–233 551.510.41:551.578.11

Denisov, P. V. and Buhaĭov, A. L., **Khimichniĭ sklad doshchiv raĭonu m. Kharkova.** [Chemical omposition of rainwater in the vicinity of Kharkov.] *Akademiia Nauk Ukraïns'koï RSR, Kiev, opovidi*, No. 2:161–164, **1957.** table, 5 refs. Russian and English summaries p. 164. **DLC** Slavic)—Data on the chemical composition of 37 samples of rainwater taken at the Meteorological tation of Kharkov Zoo Technical Institute at 6 km from the city during 1 April 1944–1 April 1945 re presented in a table. Data on air temperature and wind force during the rain are also given. t was established that the chemical composition of samples changes both qualitatively and quantitaively during the year. Content of mineral substances varies from 21.48 to 72.52 mg/liter; variations f chemical composition are caused by hydro-meteorological conditions, chiefly air temperature, ind force and direction, and thunderstorms. (*Same item as* 10.9–266, Sept. 1959, *Met. Abs.*) *ubject Headings:* **1. Chemical composition of rainwater 2. Hydrometeorological effects on ainwater composition 3. Kharkov, Ukrainian S.S.R.**—*A.M.P.*

12G–234 551.578.11:551.510.41

*Eriksson, Erik (*International Met. Inst., Stockholm*), **Chemical composition of Hawaiian rainfall.** *ellus*, Stockholm, 9(4):509–520, Nov. **1957.** 4 tables. **DWB**—Measurements of the chemical onstitution of rain in the Project Shower area showed that the ammonia and nitrate content is ery low, and that the total salt content decreases inland to extremely low values on the upper slopes f the volcanoes. (*Same item as* 10.2-295, Feb. 1959, *Met. Abs.*) *Subject Headings:* **1. Rain comosition 2. Ammonia in rainwater 3. Nitrate in rainwater 4. Salt in rainwater 5. Project hower 6. Hawaii.**—*Author's abstract.*

12G–235 546.11.02.2:551.464:551.577.13

Friedman, I. (*U. S. Geological Survey, Wash., D. C.*) and Woodcock, Alfred H. (*Woods Hole ceanographic Inst., Mass.*), **Determination of deuterium-hydrogen ratios in Hawaiian waters.** *ellus*, Stockholm, 9(4):553–556, Nov. **1957.** 3 figs., 3 tables, 3 refs. **DWB**—Previous determinaon of the deuterium-hydrogen ratios in natural waters revealed the fractionation of deuterium; a actionation resulting from differences in the vapor pressure of H_2O and HDO. Measurements of e deuterium in sea, rain, and condensate waters of Hawaii, are reported here. These results show concentration of deuterium in sea-surface waters, and an inverse relationship of D with altitude rain and condensate taken on a mountain side. The possible significance of these measurements r cloud physics studies is briefly discussed. *Subject Headings:* **1. Deuterium in sea water 2. Deurium-hydrogen ratios 3. Deuterium in rainwater 4. Hawaii.**—*Authors' abstract.*

12G–236 551.578.11:551.510.41

Gorham, Eville, **The chemical composition of rain from Rosscahill in County Galway.** *Irish aturalists' Journal*, Belfast, 12(5):122–126, Jan. **1957.** 3 refs., 2 tables. **DLC** (QH1.I83)—eport and discussion on the chemical composition of rain from Rosscahill in County Galway, eland, from April 1955 to Jan. 1956. The data are presented in tables and the results are discussed. is clear that Na is predominant among the cations while if the August sample is excluded, chloride ightly exceeds bicarbonate among the anions. A table presents a comparison of the average omposition of rain from western Ireland and from the English Lake District, and of the marine ontribution to dissolved ions. It is suggested that in this area about 80–90% of rain sodium and bout 60–70% of magnesium are of marine origin. The low proportion of marine sulphate in this in is noted. Taking all salts together, the proportions which are derived from the sea are rather rge. In Galway, just over half the totals salts appear to be of marine origin, while in the Lake istrict the proportion is even higher. *Subject Headings:* **1. Chemical composition of rainwater Galway, Ireland.**—*E.Z.S.*

12G–237 551.510.42:551.574.1:61(02)

†Green, H. L. and Lane, W. R. (*Chem. Defence Exp. Est., Porton, Eng.*), **Particulate clouds: usts, smokes and mists: their physics and physical chemistry and industrial and environmental spects.** Princeton, N. Jersey, Van Nostrand, **1957.** 425 p. 108 figs., 8 plates, refs. at end of each . **DWB** (M8 G9766pa). Review in *Science Progress*, London, 46(182):373–374, April **1958.**—he physics and physical chemistry of particulate clouds as unified systems are treated in Pt. I nder the following chapter heads: 1) Introduction (dust, smokes and mists—nature and properties particles); 2) Production of particulate clouds; 3) Physical characteristics; 4) Optical properties; Coagulation; 6) Deposition and infiltration; 7) Sampling and estimation; 8) Diffusion in the mosphere. Pt. II covers industrial and environmental aspects: 9) Collection; 10) Health hazards;) Atmospheric pollution; 12) Aerosols in nature (cloud, fog, mist and haze) and 13) Uses of parculate clouds in industry, medicine, agriculture, pest control, screening and signalling. A list of 200 journals from which the hundreds of references have been taken is included, and author and

detailed subject indexes are appended. (*Same item as* 10.1–9, Jan. 1959, *Met. Abs.*) *Su Headings:* **1. Particulate clouds 2. Aerosols 3. Atmospheric pollution.**—*M.R.*

12G–238 551.577.13:541.1

Herman, F. A. (*Dominion Experimental Station, Kentville, N. S., Canada*) and Gorham (*Freshwater Biol. Assoc., Ambleside, Eng.*), **Total mineral material, acidity, sulphur and nitroge rain and snow at Kentville, Nova Scotia.** *Tellus*, Stockholm, 9(2):180–183, May **1957.** 2 ta 8 refs. **DLC**—Analyses of total ash, sulphur, pH, ammonia and nitrate nitrogen have been made 23 monthly precipitation samples and 17 individual snow samples collected between June 1952 May 1954 at Kentville, N. S., in a predominantly agricultural area. Mean annual supply of t mineral ash was 95 kg/ha, of sulphur 9.1 kg/ha, of ammonia nitrogen 2.8 kg/ha, and of nitrate nitro 1.1 kg/ha. Average pH was 5.7, and rains more acid than this exhibited higher levels of both nit and sulphur, and a marked correlation between the latter and ammonia. Snow samples had m lower concentrations of ash, sulphur and nitrogen than rain samples collected in the same mont which may perhaps indicate a lower efficiency of snowflakes in removing materials from the atm phere. (*Same item as* 8.11–233, Nov. 1957, *Met. Abs.*) *Subject Headings:* **1. Chemical composit of precipitation 2. pH content of precipitation 3. Chemical analysis of rainfall 4. Chem analysis of snow 5. Kentville, Nova Scotia.**—*Authors' abstract.*

12G–239 551.577.13:546.39 551.577.13:546.

Hoering, Thomas, **The isotopic composition of the ammonia and the nitrate ion in rain.** C *chimica et Cosmochimica Acta*, London, 12:97–102, **1957.** table, 12 refs. **DLC, DGL**—The ammo and the nitrate ions in rain water have been quantitatively isolated by using ion exchange res The nitrogen isotope ratio of each fraction has been measured in relation to atmospheric nitrog A kinetic isotope effect has been calculated on the basis of the formation of nitrate from atmosphe ammonia. The nitrogen^{15} content of the two ions vary from rain to rain with respect to the nitrog content of atmospheric nitrogen. There is a constant kinetic isotope effect between the ammo and nitrate ion of $1.004_3 \pm 0.001_4$. This result is in agreement with the postulate that the nitr arises from the oxidation of ammonia. The isotope effect during the laboratory fixation of nitro with electric sparks was measured. *Subject Headings:* **1. Ammonia in rainwater 2. Nitrates rainwater.**—*E.Z.S.*

12G–240 551.577.13:

*Junge, C. E., **Chemical analysis of aerosol particles and of gas traces on the Island of Haw** *Tellus*, Stockholm, 9(4):528–537, **1957.** 2 figs., 7 tables, 2 refs. **DLC**—Aerosols of two differ size ranges with radii between $0.08 < r < 0.8\mu$ (large particles) and $0.8 < r < 8\mu$ (giant particles) w analyzed for NH_4, Cl, SO_4, and NO_3. Parallel with this, the concentration of corresponding traces, that is of NH_3, chlorine components, SO_2 and nitrogen dioxide was measured. The resu show that the giant particles consisted almost entirely of sea spray. Their content of NO_3^- v small compared to the data from the East Coast of the U. S. (Round Hill, Massachusetts and Hor stead, Florida). The Cl^- content of the large particles was less than 1.5% of that of the giant p ticles, confirming previous data which showed that the sea spray is almost completely restricted particles larger than 0.8μ radius. The large particles contained NH_4 in amounts comparable with other components, indicating the presence of other than sea spray nuclei in this size range. T NH_4 is probably present in the form of $(NH_4)_2SO_4$. Both particle sizes were completely missing the raining orographic clouds. All gas components were found to be present and the concentratio did not fluctuate very much. They were washed out, to a small degree, if at all, by rain. (*Sa item as* 12.2–270, Feb. 1961, *Met. Abs.*) *Subject Headings:* **1. Chemical composition of r 2. Hawaii.**—*Author's abstract.*

12G–241 551.510.42:546.13:551.578

†Junge, Chr. E. and Gustafson, P. E. (*GRD, A. F. Cambridge Research Center*), **On the distri tion of sea salt over the United States and its removal by precipitation.** *Tellus*, Stockholm, 9(164–173, May **1957.** 6 figs., 23 refs., eqs. **DLC**—Average maps for summer and winter of t distribution of chloride concentration in rainwater over the United States are presented, and attempt is made to explain them quantitatively. From various considerations, it must be conclud that the essential features of these maps—the drop in the Cl^- concentration along the coast and constant level inland—are determined by large scale vertical mixing in the troposphere rather th by washout. Large scale washout appears to be rather inefficient, so that even large and hygrosco particles, such as sea spray, can move across continents without being effectively removed from t atmosphere. (*Same item as* 10.10–194, Oct. 1959, *Met. Abs.*) *Subject Headings:* **1. Chloride in 2. Chloride in rainwater 3. Large scale vertical mixing 4. United States.**—*Authors' abstract.*

12G–242 551.574.11:551.578.11

†Komabayasi, M. (*Geophysical Inst., Tokyo Univ.*), **Salinity of individual raindrops and other uantities concerning rainfall (Some aspects of rain formation in warm cloud, Pt. 1).** *Meteorological ociety of Japan, Tokyo, Journal*, Ser. 2, 35(4):205–220, Aug. **1957.** 9 figs., table, 28 refs., 18 eqs. **WB, DLC**—Calculations of droplet growth are made based on a cloud model, through the cloud ase in which upward currents do not enter. If raindrops form on large sea-salt particles in this oud, it can be shown that the larger raindrops form on the larger sea-salt particles. Using this oud model, functional relations are presented between the size distribution of large sea-salt particles d various quantities concerning the rainfall from a warm cloud. The rainfall intensity, the flux ensity distribution of raindrops with respect to radius, the salinity of rain water in bulk, and the linity of individual raindrops are deduced. The function expressing the salinity of raindrops is und to have a minimum at a certain radius. This may be considered to show one of the tentative xplanations for the appearance of minimum value of raindrop salinity found by TURNER (1955) in e case of warm rains. Derived raindrop spectrum changes with rainfall intensity in a manner for me aspects resembling that found by BLANCHARD (1953) in Hawaii. The present calculations seem be useful to some extent for quantitative estimations on some features of rainfall from orographic arm clouds. (*Same item as* 10.9–248, Sept. 1959, *Met. Abs.*) *Subject Headings:* **1. Saline nuclei Salt content of precipitation 3. Rain from nonfreezing clouds.**—*Author's abstract.*

12G–243 551.577.13:546.185

Lal, D., Narasappaya, N. and Zutshi, P. K., **Phosphorous isotopes P^{32} and P^{33} in rain water.** *uclear Physics*, Amsterdam, 3(1):69–75, **1957.** 2 figs., 2 tables, 16 refs. **DLC**—Comparable nounts of 25-day P^{33} and 14-day P^{32} were observed in rainwater in concentrations agreeing with ose of MARQUEZ and COSTA for P^{32}. The concentrations are not inconsistent with the assumption at they are produced by spallation of atmospheric A by cosmic rays. *Subject Heading:* **1. Phos- orous isotopes in rainwater.**—*E.Z.S.*

12G–244 551.577.13:546.33

Marquez, L.; Costa, N. L. and Almedia, I. G. (*all, Centro Brasileiro de Perquisas Fisicas, Rio*), **ormation of ^{22}Na from atmospheric argon by cosmic rays.** *Il Nuovo Cimento*, Bologna, 6 6): 92–1295, Dec. 1, **1957.** table, ref. **DLC**—It was found that Na^{22} is formed as a spallation product atmospheric argon by cosmic rays. It was isolated from the fresh rain water of Rio de Janeiro, d its average activity is 0.017 dpm/l. *Subject Headings:* **1. Sodium^{22} in rainwater 2. Rio de neiro, Brazil.**—*Authors' abstract.*

12G–245 551.510.41:551.577.13

Mordy, W. A., **Report on the Third Annual Conference on Atmospheric Chemistry, May 28–30, 56.** *Tellus*, Stockholm, 9(1):127–134, Feb. **1957.** **DLC**—The purpose of the Third Conference, addition to the necessary discussions related to the maintenance, extension and improvement of the ropean and U. S. atmospheric chemical observational network, was to formulate ideas and recom- endations for the types, numbers, and locations of atmospheric and geochemical observations eded during the International Geophysical Year. Brief summaries of the following papers given ring the conference are included. Fonselius, **The recent work on variation of CO_2 in the atmos- ere in Scandinavia**; Goody, **The desirability of measuring gases by spectrographic methods**; gner, **The balance of cations and anions found in precipitation**; Gorham, **Results of precipitation mples in England**; Byers, **Measurement of Mg, Cl, SO_4 over Puerto Rico and in central U. S.**; iksson, **The geochemical balance of chloride and sulphur between sea and land**; Rossby, **Résumé some large scale synoptic variations in precipitation analysis**; Koczy, **Oceanic characteristics vorable to surface film formation**; Riehm, **The importance of boron in agriculture**; Egner, **Descrip- n of Arrhenius' observations during "Capricorn" cruise.** *Subject Headings:* **1. Chemical composi- n of precipitation 2. Atmospheric chemistry.**—*J. R. Mather.*

12G–246 551.577.13:541.132.3

Mukherjee, A. K., **Hydrogen ion concentration of monsoon rain water at Calcutta.** *Indian urnal of Meteorology and Geophysics*, Delhi, 8(3):321–324, July **1957.** 2 tables, 2 refs. **DLC**— om the present study of pH of monsoon rain water we can conclude: a) monsoon rain water is utral under Calcutta conditions (pH near 7 as contrasted with pH near 5.7 for Swedish rain); rain water disolves little carbon dioxide and the dissolved gas is not in equilibrium with atmos- eric carbon dioxide. (*Same item as* 9.4–202, April 1958, *Met. Abs.*) *Subject Headings:* **1. Hydro- n ion concentration in rainwater 2. Calcutta, India.**—*Author's conclusions.*

12G–247 551.574.11:551.578.41 551.574.11:551.575.1

Nakaya, Ukichiro (*Hokkaido Univ., Japan*), **Electron microscope studies on the nuclei of sea and snow crystals.** *Conference on the Physics of Cloud and Precipitation Particles, Sept. 1955,* *Proceedings*. pub. N. Y. Pergamon Press, **1957**. p. 36–42. 19 figs. **DLC** (QC921.5.U5). **DWB**—Electron microscope photographs of snow crystals (made by KUMAI) and of sea fog particles (by D. KUROIWA) are presented to show the nature of the nuclei on which the snow and fog form. From 255 samples of sea fog it was found that 50% had combustion nuclei, 40% sea salt and 10% soil nuclei; of the sea salt nuclei 80% were $\geqslant 1\mu$ and $20\% < 1\mu$ in diameter, also 80% of the snow crystals had nuclei. The appearance of the combustion and other nuclei with various modifications are shown in the 19 excellent microphotographs. *Subject Headings:* **1. Snow nuclei 2. Sea fog nuclei 3. Electron microphotographs of nuclei 4. Japan.**—*M.R.*

12G–248 551.**510.41**:551.**577.13**:546.264:634.9

Neuwirth, R. (*Freiburg i Br.*), **Ergebnisse neuerer luft- und niederschlagschemischer Untersuchungen und ihre Bedeutung für die Forstwirtschaft.** [Results of new chemical investigations of air and precipitation and their importance to forestry.] *Allgemeine Forst und Jagdzeitung*, Frankfurt a.M., 128(7):147–150, July **1957**. 2 figs., table, 12 refs. English summary p. 150.—The results are reported of recent analysis of the air and the rain, in particular of the CO_2 content of the air which has been determined in Scandinavia in 1955, and of studies of the influence of meteorological factors on the CO_2 content which cause so much variation that it is hardly possible to say whether the CO_2 content of the air has generally increased during the last decennia. The determination of the C^{14} content of wood is valuable in this connection because it indicates the importance of the cyclus air-sea as compared with the cyclus air-organic matter. The concentration of nutritious minerals in rainwater is compared with the demand of wood lands. Lime, potassium, and magnesium are supplied in sufficient quantity but the supply of nitrogen is too low. The situation with phosphates is not yet clear. Sulphuric compounds and chlorides are present in higher concentrations than required and the chemist can warn the forester of possible damage from these compounds. *Subject Headings:* **1. Carbon dioxide in the atmosphere 2. Chemical composition of rainwater 3. Forestry 4. Scandinavia.**—*Author's abstract.*

12G–249 551.**574.1**:551.464:551.**594.25**

Woodcock, Alfred H., **Salt and rain.** *Scientific American*, N. Y., 197(4):42–48, Oct. **1957**. photos, table. **DWB, DLC**—Two processes of cloud droplet growth are described and illustrated (1) condensation on smoke or salt nuclei and collision with smaller droplets, and (2) freezing to form snow crystals which grow by coalescence. Raindrop size distribution in relation to salt particle size distribution, salt sampling techniques, the manner by which salt particles are ejected into the atmosphere from the sea (bubble bursting), and the electrical charges on droplets ejected from the sea (which process could account for most of the electrical charge in the atmosphere), and the ejection of plankton and other useful or harmful organic matter into the atmosphere by the same bubble bursting mechanism, are also discussed and nicely illustrated. (*Same item as* 11.2–234, Feb. 1960 *Met. Abs.*) *Subject Headings:* **1. Cloud droplet formation 2. Sea salt nuclei formation 3. Bubbl bursting mechanism 4. Electrical charges on sea salt nuclei.**—*M.R.*

1958

12G–250 551.**577.13**:551.**510.4**

*†Eriksson, E., **The chemical climate and saline soils in the arid zone.** *UNESCO, Arid Zon Research*, No. 10:147–180, **1958**. 20 figs., 10 tables, 81 refs. **DWB**—A thorough review of a phases of precipitation chemistry including the composition of air and precipitation, removal o chemical constituents from air to ground, the ground as a source of chemical constituents in th atmosphere, the yearly circulation of chloride and sulphur between continents and oceans, the se as a source of chloride and sulphur, the vertical distribution of sea salt over the sea, sea salts over th continents, the transport of sea salts into arid regions and chemical hydrology. An extensiv bibliography makes this a valuable basic work on the general nature of the salt problem in precipita tion. (*Same item as* 10.6–300, June 1959, *Met. Abs.*) *Subject Heading:* **1. Chemical compositio of precipitation.**—*J. R. Mather.*

12G–251 551.**510.42**:551.**578.1**

Gorham, Eville (*Freshwater Biol. Assoc., Ambleside, Westermorland*), **Atmospheric pollution b hydrochloric acid.** *Royal Meteorological Society, Quarterly Journal*, London, 84(361):274–276, Ju **1958**. fig., table, 7 refs. **DWB, DLC**—Precipitation samples from urban deposit gages in Brita exhibit a distinct positive correlation between chloride and acidity in samples of pH <5.7. The fir order correlation coefficients for hydrogen ions and chloride in deposits from Sheffield, and fro Manchester and Salford, are shown to be highly significant, while those for hydrogen ions and sulpha are not significant. It is therefore suggested that hydrochloric acid should be considered in assessi the causes of rain acidity in urban areas. (*Same item as* 10.4–148, April 1959, *Met. Abs.*) *Subj*

Ieadings: **1. Atmospheric pollution 2. Hydrochloric acid in rain 3. Rainfall acidity 4. England.** —*Author's abstract.*

12G–252 551.464:551.322(984.8)

*Gorham, Eville (*Freshwater Biol. Assoc., Ambleside*), **The salt content of some ice samples from Iordaustlandet (North East Land), Svalbard.** *Journal of Glaciology*, London, 3(23):181–186 Iarch **1958.** fig., 2 tables, 8 refs. English and German summaries p. 181. **DWB, DLC**—Analyses or pH, Na^+, K^+, Ca^{2+}, Mg^{2+}, HCO_3^-, Cl^-, SO_4^{2-} and NO_3^- have been made on land ice samples rom Nordaustlandet, Svalbard. Total ions range from less than 0.02 to 0.46 milliequivalents per iter, with sea salt generally the dominant component although calcium and magnesium bicarbonates re relatively more abundant in a surface sample heavily contaminated by soil material from an djacent moraine. These ions, as well as potassium and sulphate, are present in most samples in xcess of possible sea-spray supply. From the surface of a crevasse to 14 m depth on one side the oncentrations of all ions except nitrate fluctuate in a similar manner. Some possible implications f the results are examined. (*Same item as* 10.2–72, Feb. 1959, *Met. Abs.*) *Subject Headings:* **1. Ice omposition 2. Salt content of land ice 3. Svalbard (Spitsbergen).**—*Author's abstract.*

12G–253 551.510.42:661.877

Holzapfel, L.; Cauer, H.; Hesse, F. and Reiter, R., **Über das Vorkommen molybdataktiver Lieselsäure in natürlichen Aerosolen.** [Origin of active molybdenum silicic acid in natural aerosols.] *Die Naturwissenschaften*, Berlin, 45(7):160, April 1, **1958.** fig., ref. **DLC**—Determination of air ollution is generally made by filtration method and by analysis of rainfall. The apparatus of IALTER and WENDE for the extraction of air humidity permits an examination at every moment. The examination of aerosols condensations in three bioclimatological stations in Germany indicates o presence of active molybdenum silicic acid at Farchant bei Partenkirchen (Alps), at Norderney (North Sea coast) and in Berlin-Dahlem. Only at Bochum has the presence of small quantities been bserved. The origin of molybdenum silicic acid is probably caused by thermic reactions. (*Same em as* 10.9–168 Sept. 1959, *Met. Abs.*) *Subject Headings:* **1. Atmospheric pollution 2. Aerosol ondensation 3. Molybdenum silic acid 4. Germany.**—*A.V.*

12G–254 551.510.41:551.578.11

Hutton, J. T. (*Div. of Soils, CSIRO, Adelaide*), **The chemistry of rainwater with particular eference to conditions in South Eastern Australia.** *UNESCO, Arid Zone Research*, 11:285–290, ub. **1958.** 2 figs., 2 tables, 15 refs. French summary p. 289. **DWB** (M84 US8cL)—Detailed nalyses of rainwater sampled at several stations in southern Australia and Victoria show definite easonal and geographic variations of the ratio of sodium to calcium. This appears to suggest that ome of the salts originate in terrestrial dust. The presence of terrestrial salts in rainwater indicates hat some soil surfaces release salt which could explain the weak salinity of some lakes. *Subject eadings:* **1. Chemical analysis of rainwater 2. Sodium in precipitation 3. Calcium in rainwater . Australia.**—*Partial transl. of author's abstract.*

12G–255 551.578.46:546.215

Ivanov, P. M., **Perekis' vodoroda v snezhnoĭ vode.** [Hydrogen peroxide in snow water.] *Ieteorologiia i Gidrologiia*, Leningrad, 9:34, Sept. **1958.** table. **DWB, DLC**—The qualitative and uantitative hydrogen-peroxide content of snow was investigated over a period of 4 years in the icinity of Barnaul (1950–1952 and 1953). Data are presented showing that the H_2O_2 content of now varies from 0.000158–0.000344% (mean values per month). Some increase of H_2O_2 content as observed in those snow samples which were taken from the lower layer of a dense compressed now cover. *Subject Headings:* **1. Hydrogen peroxide in snow 2. Snow composition 3. Barnaul, .F.S.R.**—*I.L.D.*

12G–256 551.510.41

*†Junge, Christian E. (*U. S. A. F., Geophysics Res. Directorate, Cambridge Res. Center*), **Atmos- eric chemistry.** *Advances in Geophysics*, N. Y., 4:1–108, **1958.** 31 figs., 21 tables, 152 refs., eqs. **WB, DLC**—A systematic review of the major areas of current research into the chemistry of the mosphere: 1) aerosols: their size distribution, physical composition, Aitken particles, sea-salt erosols and continental aerosols; 2) rare atmospheric gases: CO_2, O_3. N_2O, NO, NO_2, NH_3, SO_2, H_2S, l, CH_3, CO, etc. and ratio of gaseous to particle matter; 3) precipitation chemistry: removal of ace substances from atmosphere, washout processes, rainwater content of continental and of arine components, respectively; 4) air pollution components and extent of influence of pollution ound centers. Instruments, techniques, theory, basic data on each phase (in tables and graphs). icrophotographs, schematic diagrams, records, formulas and references, up to and including 1955, ound. Emphasis is on active ground level or tropospheric constituents, i.e., both natural and

artificial trace substances of variable quantity as contrasted with the rare permanent gases. (*Same item as* 9.9–16, Sept. 1958, *Met. Abs.*) *Subject Headings:* **1. Atmospheric chemistry 2. Trace elements in atmosphere.**—*M.R.*

12G–257 **551.578.11**(73)

*†Junge, Christian E. (*GRD, A. F. Camb. Res. Cen.*) and Werby, R. T. (*Werby Laboratories, Inc.*), **The concentration of chloride, sodium, potassium, calcium and sulfate in rain water over the United States.** *Journal of Meteorology*, Boston, 15(5):417–425, Oct. **1958.** 9 figs., 5 tables, 23 refs. **DWB, DLC**—The distribution of yearly averages of the concentration of various inorganic ions in rainwater over the United States is discussed. The major source of Cl^- is the ocean. The Cl^-/Na^+ ratio, however, is considerably less than that in sea water. It is very likely that this is caused by excess Na^+ from the soil. A similar distribution of excess material from the soil is observed with K^+. In contrast to Na^+ and K^+, which are rather uniformly distributed over the U. S., Ca^{++} shows highest values over the Southwest, in agreement with the occurrence of dust storms. Most of the SO_4^{--} over the ocean originates from sea spray. The source of additional SO_4^{--} is the land. Budget considerations indicate that about 30% of this additional SO_4^{--} on a global scale is due to human activities. On the basis of the data presented, the average global residence time of SO_2 is estimated to be 40 days. This value is compared with available data on residence times of other constituents which are also primarily controlled by washout. (*Same as item* 10.6–272, June 1959, *Met Abs.*) *Subject Headings:* **1. Rain composition 2. Rainwater analysis 3. United States.**—*Author's abstract*

12G–258 **551.577.13**:546.39 **551.577.13**:546.1

Junge, Christian E. (*G. R. D., A. F. Cambridge Res. Center, Bedford, Mass.*), **The distributio of ammonia and nitrate in rain water over the United States.** *American Geophysical Union, Trans actions*, 39(2):241–248, April **1958.** 8 figs., 10 refs. **DWB, DLC**—Quarterly average maps o ammonia and nitrate concentration in rain water over the U. S. are discussed. These maps indicat that the major sources for both components are near the ground and over land. Comparison wit soil maps makes it very likely that the ammonia distribution is primarily controlled by the acidit of the soil. In case of nitrate, no correlation to other geographical parameters could be found, bu again, the soil appears to be the most probable source. (*Same item as* 10.2–296, Feb. 1959, *Met. Abs Subject Headings:* **1. Ammonia in rainwater 2. Nitrate in rainwater 3. Rainwater analysi 4. United States.**—*Author's abstract.*

12G–259 **551.510.42**:**551.578.1**:581.3

May, F. G. (*U. K. Atomic Energy Authority Res. Group, Harwell*), **The washout of lycopodiu spores by rain.** *Royal Meteorological Society, Quarterly Journal*, 84(362):451–458, Oct. **1958.** fi 3 tables, 8 refs., 9 eqs. **DWB, DLC**—This report describes the determination of the washout coeffi cient of lycopodium spores by rain. The experimental results are in good agreement with tho obtained theoretically by Chamberlain (1953) after allowance has been made for the varying rai drop spectra of different types of rain. (*Same item as* 10.6–165, June 1959, *Met. Abs.*) *Subj Headings:* **1. Pollen washout by rain 2. Scavenging by rain.**—*Author's abstract.*

12G–260 **551.577.13**:**551.510.41**:546.

†Miller, Lewis E. (*Geophysics Research Directorate A. F. Cambridge Res. Center, Air Research a Development Command, Bedford, Mass.*), **The chemistry of the oxides of nitrogen in the upper atmo phere and the results of a continent-wide precipitation chemistry program for the analyses of NO and NH_4^+ in rain water.** *Air Pollution Control Association, Journal*, 8(2):138–146, Aug. **19** 18 figs. (incl. photos), 46 refs., 22 eqs. **DLC**—Preliminary and tentative results have been obtain on the photo-chemistry and vertical distribution of the oxide of nitrogen. Eight maps of the U. have been used in the study and analysis of the seasonal variations of nitric oxide in the upper atm phere, the formation and loss of nitric oxide, nitrogen dioxide and the distribution of nitrate a ammonium-nitrogen in rain water over the U. S. during July 1955 to July 1956. Data were collect by a network of 60 stations over the nation, Bermuda, Newfoundland, the Azores and weather sh over the Atlantic. *Subject Headings:* **1. Chemical analysis of rainwater 2. Oxides of nitrogen in r 3. Nitrate and ammonium-nitrogen distribution 4. North America.**—*N.N.*

12G–261 **551.510.41**:06

Neumann, G. H., **Fourth Annual Conference in Atmospheric Chemistry, May 20–22, 19** *Tellus*, Stockholm, 10(1):165–169, Feb. **1958.** **DLC**—The participants at the Conference are lis and the proceedings summarized. The first group of papers involved the work being done on C measurement and circulation in the atmosphere. Eriksson and Fonselius gave results of rec ship board measurements while Coachman showed the possibility of obtaining information of p atmospheric composition from studies of glacier ice-gas enclosures. One session was devoted urface films while another was concerned with isotopes in atmospheric chemistry. Much of the ime in these and other sessions was devoted to a discussion of sampling networks with special notice eing taken of the U. S. and Mexican networks. The need for networks to sample radioactivity in he atmosphere was discussed. (*Same item as* 10.3–183, March 1959, *Met. Abs.*) *Subject Heading:* **. Atmospheric chemistry conferences.**—*J. R. Mather.*

12G–262 **551.577.13**:546.17:551.594

*Reiter, Reinhold and Reiter, Mirjam (*both, Physikalisch-Biokl. Fors. München, Farchant bei ìarmisch, Oberbayern*), **Relations between the contents of nitrate and nitrite ions in precipitations nd simultaneous atmospheric electric processes.** *Conference on Atmospheric Electricity, 2nd, 'ortsmouth, N. H., May 1958. Proceedings,* issued **1958.** p. 175–194. 11 figs., 5 tables, 17 refs., eqs. **DWB** (M(055) C748pr)—At a valley station and at a mountain station (horizontal distance: 660 ft; vertical distance: 3624 ft), all the precipitation is collected simultaneously and separately or short periods, the duration for one sample depending on the character of the precipitation. O_2' and NO_3' contents of the samples are analyzed immediately and compared with the simul- aneous behavior of atmospheric electric field and air—earth current recorded at the two stations and t other stations in the neighborhood. Additional records of point discharge current and small ions, btained at the valley station, radiosonde data, and meteorological observations are also used for the valuation. It is found that there are relations between the chemical and the atmospheric electric ata, e.g., there is a relation between NO_2' and NO_3' contents of precipitation (both rain and snow), requency of sign reversals of the field during the precipitation, and lability energy in a layer above 00 mb. *Subject Headings:* **1. Nitrate ions in rainwater 2. Nitrite ions in rainwater 3. Atmospheric lectric field effects 4. Air-earth current effect.**—*Authors' abstract.*

12G–263 **551.577.13**:541.132.3

Rougerie, Gabriel, **Acidité des eaux en milieu forestier intertropical.** [Water acidities in tertropical forest regions.] *Académie des Sciences, Paris, Comptes Rendus,* 246(3):447–449, ın. 20, **1958. DLC**—The assumed acidity of intertropical waters is attributed, on the one hand, the high atmosphere electrification which enriches the rain water in nitric acid, and on the other ınd to the organic acids, owing to abundant vegetal materials, which are supposed to act on the ater of the soil. A series of pH measurements, made in the forest regions of the Ivory Coast, establishes that water taken at different moments of its cycle does not, in fact, present an acidity sensibly ore remarkable than those of extra-tropical settings. (*Same item as* 10.1–292, Jan. 1959, *Met Abs.*) *ıbject Headings:* **1. Chemical composition of precipitation 2. pH of rainwater 3. Forest effects on ecipitation composition 4. Ivory Coast, Africa.**—*A.V.*

12G–264 **551.577.13**:541.132.3

*Steinhauser, Ferdinand (*Zentralanstalt für Met. und Geodynamik in Vienna*), **Über die pH-Werte s Niederschlages, der Schneedecke und des Grundwassers in Wien.** [pH values of precipitation, ow cover and ground water in Vienna.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, r. B,* Vienna, 9(1):86–100, **1958.** 5 tables, 4 refs. German, English and French summaries 86–87. **DLC**—The distribution of frequency of pH-values is discussed, as determined by means a Beckmann-pH-meter in 114 cases of rainfall either at 8 a.m. following the rain-day or immediately ter the end of the precipitations. Most values lie between 5 and 6, the interval of variations tends from 3.4 to 7.4. The yearly distribution of pH-values shows a maximum in spring and a inimum in winter. Daily measurements of the pH-values of a snow-cover during periods without ecipitation are discussed, too. Comparisons of the mean values calculated from the daily pH- easurements with the pH-values determined from the precipitations collected during a month ow that the latter are considerably higher throughout. Moreover, several series of pH-measure- ents are described, which were made at short intervals during continuous rain and which show that I-values may vary considerably in the course of rainfalls of some duration. The influence of the nd direction prevailing during the rainfalls on the pH-values is discussed. A one-year series of I-measurements of subsoil-water yields, except from a few more or less short time intervals, shows lues above 7 in nearly every case, with but small variations in time. *Subject Headings:* **1. pH ntent of precipitation 2. Vienna, Austria.**—*Author's abstract.*

12G–265 **551.58**:**551.584**:**551.585.5**(08)

*†United Nations Educational, Scientific and Cultural Organization, **Climatology and micro- matology: Proceedings of the Canberra Symposium, Oct. 1956.** Its *Arid Zone Research,* Vol. 11 b. **1958.** 355 p., figs., tables, bibliogs., eqs. throughout. Titlepage in English and French. xt and résumés in French and/or English. (For listing of contents, *see* Pt. III, p. 1280, Aug. 1959, *et. Abs.* All articles abstracted separately.) **DWB** (M84 U58eL), **DLC** (QC993.7.U52). Review Osvaldo Baldacci in *Società Geografica Italiana, Bollettino,* Ser. 8, 11(4/5):235–239, April/May

1958. Review in *World Meteorological Organization, WMO Bulletin,* 7(4):187, Oct. **1958.** Review by S. R. Eyre in *Geographical Journal,* 125(2):270, June 1959.—This volume contains the papers o the Australian and foreign scientists invited by the UNESCO to the international symposium a Canberra on the climatology, and particularly the microclimatology, of arid zones. Eight session were held and about 50 papers presented. The subjects treated at the different sessions were evaporation and the water balance (9 papers); radiation and the thermal balance (7 papers); inter relationships of climatic elements and flora (13 papers); interrelationships of climatic elements an fauna (3 papers); microclimate of man and domestic animals (4 papers); modifications of micro climate (5 papers); salting and chemistry of rainwater (2 papers); climatological observationa requirements in arid zones (7 papers). In general, each paper is accompanied by a summary an bibliography. Each section is followed by a summary of the discussions and conclusions. The wor contains an index of the authors quoted and of the subjects. It constitutes a synthesis work an brings an important contribution not only to the climatology and microclimatology of the arid zone but also to the climatology and microclimatology in general sense. (*Same item as* 10.10–3, Oct. 1959 *Met. Abs.*) *Subject Headings:* **1. Arid zone climatology 2. Climatological symposia 3. Arid zon microclimatology 4. Evaporation 5. Radiation balance 6. Chemical composition of rainwate** —*A.V.*

12G–266 **551.578.11:551.510.4**

Zhavoronkina, T., **O khimicheskom sostave atmosfernykh osadkov.** [Chemical compositic of atmospheric precipitation.] *Meteorologiia i Gidrologiia,* Leningrad, 9:22–24, Sept. **1958.** 2 table fig., 5 refs. **DWB, DLC**—The chlorine, magnesium and sodium content of atmospheric precipitatic was determined by spectroscopic analysis of precipitation data at different points in the U.S.S. along the 33rd meridian and 52–54th parallels during 1948–1949, 1951–1952 and 1954. The sampl tested included 244 in summer, 179 in winter, 90 in fall and 99 in spring. Data on the season means of chlorine and sodium content of atmospheric precipitation are presented for the vario localities. In winter and summer the greatest concentration of salts in precipitation is observ near the coasts while inland the concentration diminishes. This indicates that the sea is the sour of atmospheric salts. The equation $m = \frac{\Delta C_{cl}}{\sqrt{\sigma_z{}^2\sigma_\lambda{}^2}}$ was used to show that the seasonal concentration atmospheric salts is not accidental (ΔC_{cl} = difference in concentration of chlorine in different seaso σ_z and σ_λ = mean square deviation). The higher content of chlorides in precipitation during wint than summer is the result of storms and atmospheric circulation. *Subject Headings:* **1. Chlorine rainwater 2. Magnesium in rainwater 3. Sodium in rainwater 4. Spectroscopic analy 5. Saline nuclei 6. U.S.S.R.**—*I.L.D.*

12G–267 **551.577.13:546.**

Zhavoronkina, T. K. and Dmitriev, A. A., **Raspredelenie kontsentratsiĭ khlora v atmosferny osadkakh nad materikom.** [Distribution of Cl concentration in atmospheric precipitation over t continents]. *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.,* No. 3:330–336, March **1958.** 4 fig table, 22 eqs. **DWB, DLC**—In the transport of sea salt to continents it is assumed that n stationary currents associated with cyclogenesis play a fundamental role, and these can be conside as processes of horizontal mixing in the atmosphere. The transport of salts is accomplished w south east currents and other quasi-stationary winds of the general circulation. The theoreti analysis of the distribution of chlorine in precipitation is carried out for a continent with rectangu shape along the axis of which a zonal wind blows, and the salinity of the precipitation is assum constant. The distribution of the concentration of salt for this continent model is given by formula:

$$m = \frac{sh\sqrt{K-\frac{1}{4}}(\bar{\bar{H}}-n) + sh\sqrt{K-\frac{1}{4}}n}{sh\sqrt{K-\frac{1}{4}}\bar{\bar{H}}}$$

$$+\frac{2}{\pi}e^{\xi/2}\sum_{n=1}^{\infty}\frac{1-\cos n\pi}{n(K-\frac{1}{4}+v_n{}^2)\,sh(\sqrt{v_n{}^2+KL})}\left\{\left[(K-\tfrac{1}{4})e-\frac{L}{2}\right]sh(\sqrt{v_2{}^n+K\xi})\right.$$

$$\left.+(K-\tfrac{1}{4})sh(\sqrt{v_n{}^2+K})(\bar{L}-\xi)\right\}\text{sin}$$

The concentration of chlorine in precipitation was determined along a west to east line in the direc of zonal wind flow in the atmosphere and along a line from the Barents Sea to the Black Sea. concentration of chlorine declines to 0.4 in the interior of the continent from $m = 1$ at the coa The mean level of chlorine concentration is the same in summer and winter, since the mechanis precipitation distribution is associated with cyclogenesis. In order to eliminate random erro he distribution of chlorine concentration the standard deviations were calculated. Isolines for hlorine concentration in winter and summer were drawn on maps; and the ratios of the mean values f the concentrations to the maximum and values of 2σ are added along the isolines. The concentraion of chlorine was similar for both seasons; and it declined eastward from the Atlantic Ocean. The oefficient of correlation between monthly incidence of storms and mean chlorine concentration was omputed as 0.7 ±0.18. *Subject Heading:* **1. Chlorine in rainwater 2. U.S.S.R.**—*I.L.D.*

1959

12G–268 **551.577.13:541.132.3**

Berg, Hellmut (Cologne), **pH-Werte des Niederschlages in Koln.** [pH value of precipitation t Cologne.] *Meteorologische Rundschau*, Berlin, 12(2):47–51, March/April **1959.** 11 figs., table, refs. German and English summaries p. 47. **DWB, DLC**—Measurements of the pH-value of recipitation were made in and near Cologne from the autumn of 1957 to the summer of 1958. either a diurnal or annual variation was found. The pH values are not a function of air masses. recipitation accompanied by winds from E to N seem to have lower pH values than those accomanied by wind from other directions. The pH values can be considerably less during heavy preipitation. By an analysis of the frequency distribution, two collections with a comparatively low r high pH value can be separated. The results can be only in terms of both large scale and local nfluences. Many analytical tables and scatter diagrams and curves are presented by way of illusration. *Subject Headings:* **1. pH of rainwater 2. Cologne, Germany.**—*Author's abstract and M.R.*

12G–269 **551.501.71:551.501.41** **551.501.777:551.577.13**

Eriksson, Erik (*Inst. of Met., Stockholm Univ., Sweden*), **Techniques of precipitation analysis** *ummary only). American Geophysical Union, Geophysical Monograph*, No. 3:22–23, **1959.** 2 refs. **WB, DLC**—The air and precipitation sampling and analysis techniques of EGNER and others (1955) e described, together with modifications which have been made since that date. The sampling abinet is a thermostated fiber board enclosure insulated with rock-wool. Rainwater is collected y a funnel made by cutting the bottom from a three-liter hard glass bottle. It drains into a polythylene storage bottle of appropriate capacity. In order to melt solid precipitation, the collecting nnel extends through the top of the cabinet, and into the heated interior. Air is sampled through n inverted funnel extending through the top of the cabinet. It is drawn through a mixture of ydrogen peroxide and nitric acid in a bubbler of the Cauer type. The pump is a simple aquarium erator operated as a vacuum pump. The volume of air is measured by a commercial gas meter. ulfates are determined by conductometric titration with barium trichloroacetate; chloride, by onductometric titration with silver nitrate; ammonia and nitrate, by the Nessler reagent; conuctivity and pH in the usual manner; sodium, potassium and calcium, by flame photometry; and agnesium, by lake formation with Thiazol Yellow. Details, problems, interferences, accuracy and producibility, and calculations are shown. The results of the analyses at stations covering a gnificant portion of northern Europe are published periodically in *Tellus.* *Subject Headings:* **Precipitation analysis 2. Air sampling and analysis 3. Precipitation composition.**—*Author's stract.*

12G–270 **551.577.13:551.510.41:631.4**

Eriksson, E., **The yearly circulation of chloride and sulfur in nature; meteorological, geochemical d pedological implications, Part 1.** *Tellus*, Stockholm, 11(4):375–403, Nov. **1959.** 15 figs., tables, eqs., **Pt. 2.** *Ibid.*, 12(1):63–106, Feb. **1960.** 8 figs., 9 tables. Bibliog. p. 106–109, eqs. **omments** by Christian E. Junge and **Reply** by Eriksson, *Ibid.*, 12(4):463–467, Nov. **1960,** 6 refs., eqs. **DLC**—The circulation of air-borne oceanic constituents is discussed to the extent available ta permits. From data on sea salt particles in the atmosphere and their fall rate it is estimated at they are produced at a rate of the order of magnitude 1000 million tons a year over the ocean eas. About 90% of this is precipitation over the oceans, the rest is carried into continents and is ought back to the sea in rivers. The estimated residence time for sea salt particles in the atmosere is only a few days, higher for smaller particles, which lose their identity through coalescence, d lower for larger particles, lost by rainout or fallout. From the rate of production of sea salt rticles in breaking waves it is concluded that about 0.3% of the ocean areas is covered by breaking ves. On land the residence time of sea salt may vary from a few years in peripherally, drained mid areas to thousands of years in arid areas or areas without peripheral run-off. Geochemical lance computations indicate that a major part of the sulfur in the atmosphere is of oceanic origin t does not originate as chloride through spray emitted from breaking waves. Of chemical retions taking place in the atmosphere between sea salt constituents the release of HCl from sea salt rticles due to absorption of oxidized sulfur dioxide seems to be quantitatively important and ainly responsible for variations in the Cl/Na ratio in precipitation. The deposition of chloride in ecipitation over continents shows nicely the main areas of inflow of maritime air. Dry deposition of sea salt components seems to be an important process. The rate of which these constituents are carried to the ground from the air is about 1–2 cm per second, a figure concordant with the turbulent nature of air close to the ground. As for proportions of sea salt components in precipitation some fractionation processes seem to take place at the sea surface (probably involving organic matter derived from surface films). In typical maritime areas there is always excess cations over inorganic anions suggesting association of some cations with organic acid material in precipitation. The presence of sea salt components in ground water can be taken advantage of in the estimation of regional evaporation using chloride as an indicator. Reduction of sulfur in ground waters can cause precipitation of calcium and magnesium, thus modifying the chemical properties of groundwaters considerably. The role of air borne sea salt components for the development and properties of soils is discussed in principle. Junge in his comments points out that most of the disagreement between himself and the author originates because Eriksson presents data in a different way. Eriksson acknowledges the importance of Junges comments but explains his own view in greater detail. Both refer to the work done by K. Kalle, 1953, and A. R. Meetham, 1950. *Subject Headings:* **1. Saline nuclei 2. Chloride in rainwater 3. Sulfur in rainwater 4. Origin of saline nuclei.**—*Author's abstract.*

12G–271 551.577.13:546.26 551.577.13:546.17

Fonselius, Stig (*Internatl. Met. Inst., Stockholm*), **Some estimations of organic carbon and nitrogen in precipitation.** *International Oceanographic Congress, 1st, N. Y., 1959, Preprints of abstracts o papers.* Issued Wash., D. C., AAAS, **1959.** p. 859–860. German summary p. 860. **DWB** (551.46082. I61pr)—The likelihood that the organic matter present in the surface film over large areas of the sea is transported into the air by a bubble-spray mechanism is suggested by an examination of some estimations made of organic carbon and nitrogen in precipitation. It is proposed tha the decomposition of organic nitrogen compounds in the sea is the source of ammonia in the atmosphere. *Subject Headings:* **1. Carbon in precipitation 2. Nitrogen in precipitation 3. Bubble spra mechanism 4. Ammonia in atmosphere.**—*I.S.*

12G–272 551.577.13:546.2

*Harper, Horace J., **Sulfur content of Oklahoma soils, rainfall and atmosphere.** *Oklahoma Agricultural Experiment Station, Bulletin,* No. B536:1–18, Nov. **1959.** 5 tables, 8 refs. **DA** (100 DK4 —This publication summarizes information on the amounts of sulfur in Oklahoma soils and on th amounts of atmospheric sulfur deposited by rainfall. Data are given on: (1) sulfur and nitrogen i 170 paired samples of virgin and adjacent cultivated soils; (2) sulfur, nitrogen and phosphorus i 18 soil profiles; (3) inorganic sulfur in 11 soil profiles to a depth of 7 feet; (4) atmospheric sulfu deposited by rainfall at Stillwater, Okla., during the 15-year period 1927–42, except 1940 and at othe Oklahoma locations for lesser periods; (5) and atmospheric sulfur content at Stillwater and at tw locations in Minnesota during a 12 month period in 1941–42. The average sulfur content of rainfa at Stillwater was 8.7 pounds per acre per year. At other locations the annual quantity varied fro about 6 to 18 pounds per acre. Atmospheric sulfur at Stillwater, Okla. was less than 4 per ce of that present at St. Paul, Minn. and was comparable to that at Bemidji, Minn. Sulfur dioxide w absorbed on the surface of a lead peroxide coated fabric in this study. *Subject Headings:* **1. Sulfur rainwater 2. Sampling methods 3. Oklahoma 4. Minnesota.**—*E.Z.S.*

12G–273 551.510.42:546.22 551.577.13:546.

*†Jordan, Howard V.; Bardsley, Charles E., Jr.; Ensminger, L. E. and Lutz, J. A., **Sulfur conte of rainwater and atmosphere in Southern states as related to crop needs.** *U. S. Dept. of Agricultu Technical Bulletin,* No. 1196, March **1959.** 16 p. 2 figs., 6 tables, 39 refs. **DLC**—During t investigations, rainwater was collected at 109 locations (Fig. 1) in the southern U. S. and was analyz for sulfur during the three year period, 1953–55. Rainwater collected in Virginia, Kentucky a Tennessee was found to contain more sulfur than did that from the other states—Alabama, Arkans Florida, Georgia, Louisiana, Mississippi, N. Carolina and Texas. In the rural areas of these ni states average accretions of sulfur in rainwater were 5.8, 4.1, and 6.3 pounds per acre (table 2) 1953, 1954, and 1955, respectively. The general average for the three years was 5.4 pounds per a The principal source of sulfur in atmosphere and rainwater is probably the discharge of combusti bases from burning coal and wood. Seasonal variations in the sulfur content of rainwater are sma Sulfur in rainwater makes only a minor contribution to the sulfur required by crops in the ni cooperating southern states other than Virginia, Kentucky and Tennessee. *Subject Headin* **1. Sulfur in rainwater 2. Sulfur in atmosphere 3. Southern U. S.**—*I.S.*

12G–274 551.510.41:551.577

Junge, Christian E. (*GRD, AF Camb. Res. Center*), **Air chemistry.** *American Meteorolog Society, Bulletin,* 40(10): 493–498, Oct. **1959.** 2 tables. **DWB, DLC**—The field of atmosphe chemistry, which is defined as the chemistry of trace substances in the troposphere, is reviewed. Trace substances can be present as aerosols or as gases. Major sources of aerosols are the ocean and industrial activities. The chemical composition of the aerosol particles is not only determined by their source but also by various processes in the atmosphere—notably, reactions with gas traces. Only little is known about trace gases like SO_2, H_2S, NH_3 or NO_2. Of special importance for meteorology is CO_2 and its long-term fluctuations. The facts and possible reasons for its 10 percent increase during this century are discussed. The last part of the discussion is concerned with the physical processes by which the trace substances are removed from the atmosphere, primarily the role of precipitation. *Subject Headings:* **1. Atmospheric chemistry 2. Chemistry of precipitation 3. Aerosols.**—*Author's abstract.*

12G–275 551.577.13:546.22

Kanno, S.; Fukui, S. et al. (*all, Pub. Health Lab., Japan*), **Atmospheric SO_2 concentrations observed in Keihin Industrial Center and their relation to meteorological elements.** *International Journal of Air Pollution*, N. Y., 1(3):234–240, Jan. 1959. 13 figs., 3 tables, ref. **DWB, DLC**—Atmospheric sulfur dioxide concentrations have been measured in one of the most important industrial areas of Japan, the Keihin manufacturing district between Tokyo and Yokohama. The SO_2 concentrations measured over a 1-yr period did not exceed 0.19 parts per million. The data were correlated with daily, seasonal, climatological and meteorological data. *Subject Headings:* **1. Sulfur dioxide in atmosphere 2. Weather influences on sulfur dioxide concentrations 3. Keihin, Japan. I. Ikeda, H. II. Ono, Y.**—*Authors' abstract.*

12G–276 551.577.13:546.21

*Komabayasi, M. (*Geophysical Inst., Tokyo*), **Dissolved oxygen in rainwater and its relation to the raincloud structure, Pt. 1, Precipitation from September to March.** *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 37(1):22–34, Feb. 1959. 6 figs. (incl. photos), 2 tables, 9 refs. Japanese summary p. 34. **Pt. 2, Precipitation from April to September.** *Ibid.*, p. 35–41. 4 figs., 3 tables, 7 refs. Japanese summary p. 40. **DWB, DLC**—In Pt. 1, dissolved oxygen content in rainwater has been measured in Tokyo by means of Winklar's titration method since September 1957. The sample of rainwater was collected in a bottle containing a liquid paraffin. In most cases of rainfall, rainwater was found to be unsaturated with the dissolved oxygen at the time of its arrival at the ground as MIYAKE and SARUHASHI (1949) pointed out, its saturation percentages being between 85 and 100% for cases during the period of September 1957 to March 1958. Snow was found to contain about 6 cc oxygen per liter of melted snow, which is about 60% as compared with the oxygen content of saturated water at 0°C and normal pressure. Values of oxygen content for each case of precipitation were related to the structure of rainclouds. This shows that the oxygen content in rainwater has a close correlation with the height of cloud base and with the mechanism of raindrop formation. A possible explanation for the cause of the unsaturation and the significance of the obtained results for studies of precipitation mechanism are discussed. In Pt. 2, the data for the summer-half season from April to September are reported. Rains during thunderstorms have been found to be unsaturated with oxygen to a greater extent than other rains. This fact seems to suggest that the ice phase predominates in thundercloud more appreciably than in other rainclouds. In this respect, rains of typhoon rain-band are found also to have a similar nature. The chloride content in rainwater was found to be larger in the rains of the first type of which the oxygen content seemed to be the saturation at the temperature and pressure in the cloud than in the rains of the second type of which oxygen content seemed to be appreciably less than the saturation in the cloud. This suggests that the rains of the first type tend to occur in a maritime air mass which contains larger amount of salt particles. *Subject Headings:* **1. Oxygen in rainwater 2. Oxygen in snow 3. Raindrop formation 4. Rainwater analysis 5. Salt in maritime air masses 6. Japan.**—*Authors' abstracts.*

12G–277 551.577.13:551.510.41

Macků, M.; Podzimek, J. and Šrámek, L., **Distribution of some chemical compositions in atmospheric precipitations over Czechoslovakia.** *Geofisica Pura e Applicata*, Milan, 42:24-31, 1959. 8 figs., 6 refs. **DLC**—Since the beginning of the IGY, collections of precipitation for chemical analysis have been made at 22 sample stations distributed all over the territory of Czechoslovakia at different heights above sea level. Analyses are carried out in the laboratories of the Geophysical Institute, Department of Physics of the Air, Hradec Králové. This preliminary report deals with the results of analyses during which the content of chloride ions was determined independently by the polarigraphic and the microtitration technique, while the content of nitrate ions was established polarigraphically. Distribution of concentrations of chlorides over the territory of Czechoslovakia represents a roughly homogeneous distribution of concentrations varying in a half year average from 0.6 mg/l to 6.6 mg/l. Generally higher concentrations can be found in mountain stations in the neighbourhood of industrial centers. In the winter months the values are higher than in the summer months in most of the stations. This is commonly due to a higher content of chlorides in solid precipitation as can be seen from the enclosed chart. A correlation between the concentration of chlorides and the intensity of the precipitation is not always clearly visible. Distribution of nitrates does not correspond with the character of the iso-lines of chlorides. Average concentrations range from 0.2 mg/l to 1.5 mg/l. The highest values were not found in the precipitations collected in the mountain stations. This would suggest a different distribution of chemical components of chlorides and nitrates in the lower levels of the troposphere which is clearly illustrated by the established concentrations in the region of High Tatra where the precipitations are collected in two neighbouring stations the height difference of which reaches nearly 2000 m. *Subject Headings:* **1. Chemical composition of precipitation 2. Chloride ions 3. Nitrate ions 4. Czechoslovakia.**—*Authors' abstract.*

12G–278 **551.577.13:551.510.41**

†Madgwick, H. A. I. and Ovington, J. D., **Chemical composition of precipitation in adjacent forest and open plots.** *Forestry*, London, 32(1):14–22, **1959.** 22 refs. **DA** (99.8 F767), **DLC**—The chemical composition of the precipitation in three open plots and under thirteen different forest canopies is compared for a 2-year period at an experimental forest in southeast England. The average contents of sodium, potassium, calcium, and magnesium in the precipitation in the open are 19, 3, 11 and less than 4 kg/Ha/annum respectively, compared with 33, 24, 24 and 10 under the forest cover. Only very small quantities of phosphorous were present in the precipitation. *Subject Headings:* **1. Chemical analysis of precipitation 2. Potassium in rainwater 3. Calcium in rainwater 4. Magnesium in rainwater 5. Forest canopy effects on precipitation 6. England.**—*E.Z.S.*

12G–279 551.464:546.22 **551.577.13:546.22**

Oddie, B. C. V. (*Met. Office, London*), **The composition of precipitation at Lerwick, Shetland.** *Royal Meteorological Society, Quarterly Journal*, 85(364):163–165, April **1959.** fig., 2 tables, 3 refs. **DWB, DLC**—It is shown that most of the salts deposited at Lerwick arrive as sea-spray rather than in true precipitation. Mg, K and Na are present in very nearly the same proportions as in sea water: but there is a very great deficiency of chlorine, which, it is argued, can only be explained on Cauer's hypothesis that NaCl in aerosol form is dissociated and that Cl or HCl is released. (*Same item as* 11.6–339, June 1960, *Met. Abs.*) *Subject Headings:* **1. Precipitation composition 2. Salt spray 3. Lerwick, Shetland Is.**—*Author's abstract.*

12G–280 **551.577.13:546.22**

Östlund, Göte (*Geological Survey of Sweden, Stockholm*), **Isotopic composition of sulfur in precipitation and sea-water.** *Tellus*, Stockholm, 11(4):478–480, Nov. **1959.** table, 4 refs. **DLC** As an attempt to approach the question of the origin of air-borne sulfur, it was intended to make measurements of natural S^{35} and determine the S^{32}/S^{34}-ratio of sulfur in rainwater. For different reasons the S^{35} counting had to be omitted, but the S^{32}/S^{34}-ratio, and the sulfur content of a number of samples of precipitation and sea water were made. *Subject Headings:* **1. Sulfur in rainwater 2. Sulfur in sea water 3. Origin of air-borne sulfur.**—*Author's abstract.*

12G–281 **551.510.41:551.574.1**

Papée, Henry M. (*Nat'l Res. Council of Canada, Ottawa*), **On the chemical composition of atmospheric aerosols, Pt. 1, Some stoichiometric aspects of the problem.** *Geofisica Pura e Applicata*, Milan, 44:191–203, Sept./Dec. **1959.** 9 figs., 2 tables, 53 refs., **Pt. 2, Trends between some chemical components of rainwater and physical variables over the United States.** p. 204–215, 4 tables, 15 refs., **Pt. 3, Trends of the total annual precipitation with respect to the chemical content of rainwater over the United States.** p. 216–223, 3 figs., 2 tables, 12 refs., eq. **DLC**—Following a recent hypothesis on the role of activated sodium chloride particles as possible condensation and sublimation nuclei, an analysis of data given by C. Junge on the chemical composition of aerosols, is made. It is established that all reported giant nuclei fall into three distinct categories of composition and that within each of these categories the ratio of the sums of anions to the sums of cations for constituents for which analyses were made, remains remarkably constant throughout the days of sampling, and for both geographic positions at which sampling has been carried out. A dependence of the hydroxide-carbonate content, on that of nitrate is also indicated in the "alkaline" nuclei. The system is treated as a saturated solution, and it is shown by the procedure of continuous variations that singularities occur at particular ratios of the prevalent chemical groups in solution, possibly indicating formation of complex species. This, together with the presence of double salts in the solid phase may be partly the reason for the constancy of ratio of sums in the groups of particles studied by Junge, while the grouping itself may depend on the origin and subsequent transformations of the particles, In part 2 the author states "Annual average results of rainwater analysis carried out by C. Junge at about 60 stations of the United States sampling network are used in an attempt to correlate the ionic species present in rain, as a general contribution to atmospheric chemistry. Correlation with physical parameters is attempted at the same time in some cases, and the resulting trends discussed. The results obtained are presented in the general form of linear and planar correlation, and linear regression coefficients." In part 3 it is found that the results obtained are in agreement with the proposed role of activated sodium chloride as a nucleus of a substantial part of the atmospheric precipitation. *Subject Headings:* **1. Chemical analysis of aerosols 2. Precipitation composition 3. Annual precipitation variations 4. Sodium chloride nuclei 5. United States.**—*Authors' abstract.*

12G–282 551.577.13:541.132.3

Robinson, R. A. (*Univ. of Malaya, Singapore*), **The pH of rain water from the botanic gardens.** *The Gardens' Bulletin,* Singapore, 17(2):244–250, Dec. 5, **1959.** fig., 2 tables. **DLC**—The pH of the rain water falling in the Botanic Gardens has been examined over a three year period, March 1956 to February 1959. pH measurements were made in the usual way with a glass electrode standardized by a phosphate buffer. These observations made it possible to determine the annual variation of the pH of rain water. Tables and a graph suggest this variation. One notes three maxima: the first in April, the second in September and the third in December. It may be significant that the first two maxima occur at the beginning and at the end respectively of the South-West monsoon; the third maximum occurs about half way through the North-East monsoon. The pH of thunderstorm rains seems inferior to the pH of ordinary rains. Some diminution in pH such as this would be expected as the result of the formation of oxides of nitrogen during thunderstorms. *Subject Headings:* **1. pH of rainwater 2. pH variations 3. Singapore.**—*A.V.*

12G–283 551.578.41:551.510.41

Rogers, S. M. and Feth, J. H. (*both, U. S. Geol. Sur., Menlo Park, Calif.*), **Chemical constituents in snow from Sierra Nevada, California and Wasatch Mountains, Utah.** *Western Snow Conference, 27th, Reno, April 1959, Proceedings,* pub. Sept. **1959.** p. 79–87. 5 figs., table, 4 refs. **DWB**—The Water Resources Division of U. S. Geological Survey has made a study of inorganic chemical constitutents determinable in snow. In earlier stages the samples were collected in a 4 liter serum bottle and melted. Later they were stored in chemically clean baskets. Water obtained by melting snow samples was than analyzed. Chloride was determined in later stages. In the Sierra Nevada snow the concentration of chloride was 0.5 ppm. Study of a few samples of water in relation to their nearby parent snowbanks shows that the process of melting causes measurable chemical changes. *Subject Headings:* **1. Chemical composition of snow 2. Sierra Nevada, Calif. 3. Wasatch Mts., Utah.**—*A.H.K.*

12G–284 551.577:551.501.45

*Tinn, A. B., **Rainfall analysis at Woodthorpe, Nottinghamshire.** *Meteorological Magazine,* London, 88(1041):65–66, March **1959.** 2 tables, **DWB, DLC**—An analysis of rainfall in Nottinghamshire, Eng. is given. It covers a period of 21 years from 1936–1956. In Table 1, the mean number of days in each month are shown with the amount of rain. In April and May the rainfall was at a minimum. In April 1 inch of rain was not recorded even for one day in 21 years' average. The maximum average was for January in 18.8 in. In Aug. 1 in. or more rain was recorded for 3 days. Average number of days when there was rainfall is 179.4. In Table 2 the amount of rain contributed by daily amounts is shown percentagewise. *Subject Headings:* **1. Rainfall analysis 2. Nottinghamshire, Eng.**—*A.H.K.*

12G–285 551.577.13:551.510.41:551.579.1

Voronkov, P. P., **Osnovnye zakonomernosti formirovaniia khimicheskogo sostava poverkhnostnykh vod.** [Basic principles of the formation of the chemical composition of surface waters.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, 3rd, Oct. 1957, Trudy,* Vol 10, issued **1959.** p. 7–18. 2 figs., 2 tables. **DWB**—The diversity in the chemical composition of surface waters in the U.S.S.R. as determined by the conditions of its formation within different geographical zones and in different strata of the soil in the same zone is examined. Atmospheric precipitation influences considerably the chemical composition of surface water of swamps, rivers and lakes only in the north; southward, where the soil is more mineralized, the influence of atmospheric precipitation is not as important. Large differences in the amount of mineralization of surface waters are the result of local conditions of pollution and removal of aerosols of terrestrial origin from the atmosphere. Seasonal variations in atmospheric composition in different regions influence the chemical composition of atmospheric precipitation and, hence, of surface waters. The nature of the soil surface over which atmospheric waters flow and the accompanying solvent action is decisive in determining the hydrochemistry of surface waters. The formation of the chemical composition of waters flowing over an impermeable soil leads to special categories of surface waters, namely soil surface slope waters in which the chemical components depend on salinity of the soil, mineral composition of the soil forming rocks and intensity of adsorption exchange processes. Waters draining from comparatively thin highly moistened soil layers and forming their chemical composition within these layers constitute the category of soil-surface waters which form the principal mass of water filling the channel network during spring high water and rain floods. A third category of waters is that of the soil ground waters. With the aid of data in tables and in the text the author discusses the chemical composition of atmospheric precipitation of different geographic zones of the U.S.S.R., the chemical composition of surface slope waters of Western Turkmeniia, the ionic composition of the waters of the different genetic categories, the mineralization of the different geographic zones, etc. *Subject Headings:* **1. Chemical composition of surface water 2. Precipitation chemistry 3. U.S.S.R.**—*I.L.D.*

12G–286 551.579:551.481.1:543

Votintsev, K. K., **Glavneĭshie rezul'taty gidrokhimichiskikh issledovaniĭ oz Baikal.** [Principal results of hydrochemical investigations of Lake Baikal.] *Vsesoiuznyĭ Gidrologicheskiĭ S"ezd, 3rd, Oct. 1957, Trudy,* Vol. 10, issued **1959.** p. 96–102. 2 figs., table. **DWB**—The author discussed the hydrochemical regime of Lake Baikal, the dynamics of individual chemical elements in its waters, the paths of their migration in the lake, the role of individual biological, biochemical, physico-chemical, and other processes in this dynamics. The chemical composition of the waters of Lake Baikal is more or less identical over the entire lake and the seasonal variation of bicarbonates, sulfates, chlorides, calcium, magnesium, sodium and potassium is slight and irregular. The compounds of biogenic elements, components of gases and organic matter are not constant throughout the year but show regular seasonal and spatial variations, which are determined by biological and biochemical processes within different water layers. The hydrochemistry of this lake also involves the chemistry of the saturated silt layers of the lake and bottom water layers. The latter, especially the bottom solutions saturating the upper layers of bottom lake deposits, markedly differ chemically from the upper strata of water in that the bottom waters contain a considerable amount of ammonia nitrogen. The vertical and seasonal dynamics of the ingredients show a distinct vertical zonation and 4 zones can be established, namely: 1) an alternating zone embracing the depth from the surface to 250–300 m (region of seasonal variations of various hydrochemical elements); 2) a perenneal zone including the main water layer from 250–300 meters to the bottom; 3) bottom zone situated immediately at the lake bottom; and 4) zone of silt waters below the surface of silt deposits. The formation of the chemical substances of the water of Lake Baikal depends upon the inflowing waters supplying it and the atmospheric precipitation. The chemical characteristics of both are described in detail and the annual chemical balance of Lake Baikal is analyzed. Also the seasonal variation of the various chemical elements, the variation of photosynthetic activity, etc., are examined. *Subject Headings:* **1. Hydrochemical investigations 2. Precipitation chemistry 3. Lake Baikal, Siberia, U.S.S.R.** —*I.L.D.*

12G–287 551.461.2:547.54 551.578.46:547.54

Wilson, A. T., **Surface of the ocean as a source of air-borne nitrogenous material and other plant nutrients.** *Nature,* London, 184(4680):99–101, July 11, **1959.** fig., table, 6 refs. Preliminary results given in his **Organic nitrogen in New Zealand snows.** *Ibid.,* 183(4657):318–319, Jan. 31, **1959.** table, 4 refs. **DLC, DWB**—A table gives values in parts-per-million of NO_3^-, NO_2^-, NH_4^+, albuminoid-N, total N^+, Na^+, K^+, corrected K^+, K^+/Na^+ for 9 samples of snow collected between April 26 and Aug. 2, 1958 (in preliminary report), and on Aug. 22 and Sept. 10, 1958 (in final report), on Mt. Ruapehu, New Zealand (100 mi from the sea) at elevations from 5300 to 8070 ft elev, at 6000 ft on Mt. Egmont (20 mi from sea), and at 7000 ft on Tasman Glacier, New Zealand (25 mi from the sea). In all of these places the tree-line is at 3000 or 4000 ft. Samples were also taken from rain at Wellington (sea level) in a southerly storm on April 26, at 10 mi upwind from the sea, from typical ocean water and from ocean foam collected on rocky coast north of Wellington during strong on-shore westerly winds. The snow samples were taken where contamination from organic (plant and animal) or insoluble inorganic matter was eliminated, and at a season (winter) when pollen was negligible. Almost total lack of nitrate or nitrite-nitrogen rules out lightning fixation as source. Theory advanced that ocean is source of N content. However the ocean contains only .008 ppm albuminoid-N and a K^+/Na^+ ratio of 1/27, whereas the rain and snow contain amounts ranging from .02 to 0.2 ppm of albuminoid-N, and K^+/Na^+ ratios ranging from 1/10 to 9/10, or an order of magnitude higher than the sea in general. Explanation might be that the surface layers of the sea contain a higher N content and a higher K^+/Na^+ ratio on account of the large amount of organic matter which rises to the surface of the sea. Samples of ocean foam show very high N content and a K^+/Na^+ ratio double that of typical ocean water. A curve showing excess potassium concentration (K^+ minus 1/27 Na^+ concentration) plotted against albuminoid-N concentration from ocean foam and snow samples follows a straight line relationship, giving evidence of a common origin (i.e., the surface layer of the ocean). Nitrogen cycle at places with rough oceans to windward is described as follows:

1) nitrogen dissolves in sea, 2) it is fixed by marine organisms, 3) marine organisms rise to surface, 4) they are partly decomposed by other marine organisms into ammonia, etc., 5) decomposed products are carried into air by bursting bubbles in white caps, 6) drops with N content are evaporated leaving nuclei which are carried far inland, 7) nuclei rich in N and other salts serve as nuclei for rain or snow and 8) rain or snow falls and fertilizes soil for plant growth. Thus in areas with stormy seas to windward the process described above may be more important than the lightning fixation process for supplying N to soil. Objections to theory are enumerated and discussed. (*Same items as* 12.4–180, April 1961, and 11.8–278, Aug. 1960, *Met. Abs.*) *Subject Headings:* **1. Nitrogen in snow 2. Chemical analysis of snow 3. Bursting bubble source of atmospheric nitrogen 4. Nitrogen cycle sea-atmosphere-soil 5. New Zealand.**—*M.R.*

1960

12G–288 **551.577.13:016**

†Mather, John R., **Annotated bibliography on precipitation chemistry.** *Thornthwaite, C. W., Associates. Lab. of Climatology, Publications in Climatology,* 13(2); Contract AF 49(638)-409, Technical Note No. 2, **1960.** p. 47–154. 147 refs. **DWB**—The present compilation of 147 references on precipitation chemistry is an extension of an informal compilation of 70 articles on this subject prepared for THORNTHWAITE by MALCOLM RIGBY and GEZA THURONYI of *Met. Abs.* in July 1959. The annotated references include literature originally published from 1855–1960, about half of it since 1951. An author, subject, chemical constituent and geographic index is provided. Sources (mainly *Met. Abs.* but some material from the *SIPRE Bibliography*) are clearly indicated and acknowledged. Origin of constituents, relation with meteorologic factors, methods of sampling and analysis, as well as over a score of constituents and radioisotopes are among the subjects covered. Sampling and analysis was carried out for short or long periods in many parts of the world prior to 1950, but since then extensive networks have been established in widespread regions to keep track of radioactive constituents. *Subject Heading:* **1. Precipitation chemistry bibliographies.**—*M.R.*

12G–289 **551.577.13:546.17:551.594**

Viemeister, Peter E. (*Grumman Aircraft Eng. Corp.*), **Lightning and the origin of nitrates found in precipitation.** *Journal of Meteorology,* Boston, 17(6):681–683, Dec. **1960.** 2 figs., table, 9 refs. **DWB, DLC**—The idea that nitrate in rain is produced primarily by lightning discharge in the atmosphere is questioned. The author's findings like that of HUTCHINSON show that for the data considered there appears to be little correlation between thunderstorm activity and the nitrate content of rain. Two figures are given to show the chronological patterns. The first shows the average monthly total nitrogen fallout per acre for Ithaca and the average monthly thunderstorm activity for an eighteen year period. While there was insignificant thunderstorm activity during Jan. and Feb. there were substantial quantities of nitrogen in the precipitation. In the second thunderstorm frequency was plotted, but instead of total monthly nitrogen fallout, the concentration of nitrogen per unit volume of precipitation is plotted. The concentration of nitrogen was relatively constant throughout the year in spite of marked increases in thunderstorms during the summer. Alternative sources of nitrates are given as: (a) nitrous oxide, derived from the soil through the action of micro-organisms, may provide nitric oxide through ultraviolet radiation in the presence of oxygen; (b) ammonia, decomposed either by photochemical oxidation as suggested by DHAR and RAM or by spontaneous oxidation on the disturbed surface of the seas at the air-water interfaces of bubbles might provide the nitrates; (c) under the action of extra-terrestrial radiation, the reaction of neutral molecules of nitrogen with oxygen ions or the reaction of oxygen atoms with ionized molecules of nitrogen in the ionosphere may produce nitric oxide ions as suggested by KRASOVSKIĬ in reporting rocket and satellite measurements. *Subject Headings:* **1. Nitrate sources in rain 2. Lightning effects 3. Ithaca, N. Y.**—*E.Z.S.*

12G–290 **551.577.13:546.32/3**

Wilson, A. T. (*Victoria Univ., Wellington, N. Z.*), **Sodium/potassium ratio in rain-water.** *Nature,* London, 186(4726):705–706, May 28, **1960.** table, 4 refs. **DWB**—Wilson states that B. C. V. ODDIE'S comment on Wilson's article **Surface of the ocean as a source of air-borne nitrogenous material and other plant nutrients,** is scarcely justified in ruling out the hypothetical mechanism as a source of some of the excess potassium in European rains. One must consider the total amount of potassium deposited each year. The high sodium/potassium ratios on the coast are caused not by low potassium deposition but by high sodium deposition due probably to wind-blown bulk sea water. *Subject Heading:* **1. Sodium/potassium ratio in rainwater.**—*E.Z.S.*

PART III. RECENT TRANSLATIONS AND ANALYTICS FROM SERIALS AND COLLECTED WORKS

Note: Material listed in these sections will not be included in the monthly indexes until abstracted.

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